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Collection Book #21

Nos. 28323 – 28868

Bolivia
all done except
44?

F. R. Fosberg #21

Nos. 28323 – 28868

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Collection and Field Note Book

No. 21

(August 6, 1947 - Oct. 24, 1947)

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Collection Book #21
Nos. 28323 – 28868

Bolivia
all done except
no 44?
p. 54

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Nos. 28323 – 28868

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1947 Peru

dae
I (107) Aug. 4 – Paso de Acanacu

steep sparsely brushy slope 3900 m. (2)

28323 Pernettya
1 common

1 24 Gaultheria
rare

1 25 Gerardia
rare

1 26 Gaultheria
common

3 27 Galium
rare, rock crevice

3 28 Gaultheria
common, mostly sterile

1 29 Rubus
rare, local on steep slopes

(110) Aug. 6 Puente Mercurio,
Rio ~~Mayotambo~~ Yanamayu,
well above where it unites with R. Mayotambo to form Rio Cosnipata
thick wet forest on steep slope

3 30 Calceolaria
rare in wet ravine

1. 31 Rubus
common in second growth slopes

Cuzco – Paucartambo

13°9' S
71°36' W

berries lavender,
said to be poisonous
"macha macha"
fruit black.

recumbent; flowers
rose-purple.
berries black,
edible.
prostrate, fruit
greenish.
fruit black

small shrub; fruit
3800 m. (2) very large, free from
receptacle

Tambomayo

2500 m. (2.)

suffrutescent herb 2 m. long.
flowers yellow.
tangled vine fruit
immature, said to be black + edible when ripe.

1947 Peru

28332 Calceolaria
6
common in wet places

10Cu 33 Cinchona pubescens
common locally on steep slope

10 34 Cinchona pubescens
same

6 35 Palicourea
in undergrowth in dense forest on steep slope

15 36 Cinchona
common locally on steep slope, mostly

5Cu 37 Cinchona
same

5 38 Cinchona
same | Det. P.E. Berry, 1998

6 39 Fuchsia sanctae-rosae O. Kuntze
common in brush near road

Cuzco - Paucartambo

herb 1 m. tall; flowers bright deep orange.

tree 10 m. tall; leaves dull above; flowers very fragrant, crimson outside, pink inside tube, pale pink inside of lobes. Fruits infected with Elsinoe cinchonae.
(bark sample A)

same, tree 8 m. tall
(bark sample B)

slender shrub 2 m. tall, fruit green.

tree 10 m. tall, 20 cm. thick; flower crimson without and inside tube, lobes pink within, odorless (only one seen); fruit mostly immature, apparently infected with Elsinoe.
(Bark sample E)

same, ~~buds pink~~ no. flos.
(Bark sample C)

same buds pink.
(bark sample D)

shrub 2-3 m. high, flowers scarlet

1947 Peru

28340 Monnina
4
local in thick tangled
2 41 Styrax
local in undergrowth
4 42 Mertera granadensis
wet place at side of
road
4 43 Siphocampylus
bushy slope

4 44 Fuchsia austromontana I.M. Johnson
common on bushy slope
Det. P.E. Berry, 1998
✓ Aug. 6 – Rio ~~[illegible]~~ Yanamayu
below Puente Mercurio
steep slopes of slaty
rotten shale, second
growth brush.
3 45. Melastomataceae
common
46. Siphocampylus
common, open slopes

2 47 Vernonia
common on open slopes
4 48 Fuchsia chloroloba I.M. Johnson
Det. P.E. Berry, 1998

Cuzco – Paucartambo

vine-like, flowers
deep purple.
slender shrub;
flowers white.
prostrate; flowers
pale greenish; fruit
juicy, red.
elongate shrub,
flowers ~~[illegible]~~
scarlet, lobes greenish
yellow.
weak shrub 1.5 m. tall,
flowers crimson.

2300 m. (a)

shrub 2 m. tall,
flowers crimson-purple.
~~fls~~ herb 1 m. tall,
fls. greenish-yellow,
red outside of tube,
~~[illegible]~~ anthers black.
herb 1.4 m. tall,
flowers purple.
~~[illegible]~~ tuberous-rooted slender
shrub, flowers pendent, vermillion
with green lobes.

1947 Peru

283 49 Polypodium
common

✓ (111) Aug. 4 Santa Ysabel,
Rio Cosnipata
done
very weedy cultivated land
along river.

50 Eupatorium
common

5 51
common

1 52 Gardenia
cultivated

3 53 Acalypha

4 54 Centropogon

31Cu 55 Cinchona (Ladenbergia) magnifolia R.&P.
rare, ~~a~~ in clump of trees
on wet bench above river.

6 56
common weed in cultivated field

1 57 Drymaria
common weed in cultivated field

5 58 Siparuna
thicket near river, wet ground

---

herb 1 m. tall, flowers
white.

herb 1 m. tall; flowers
violet.

shrub; flowers
white, fragrant.

shrub 2 m. tall.

elongate shrub;
flowers vermillion,
lobes yellow, column
pale yellow, anthers blackish.

tree 18 m. tall, 40 cm. thick;
leaves sub-glossy; flowers
white, very fragrant
with gardenia-like odor,
corolla lobes somewhat fleshy.
(bark sample) fruit mostly immature

exct, flowers pinkish white.

sprawling shrub, strong lemon grass
odor, fruits turning pinkish.

Aug. 6 – Valley of Rio Mayutambo and Cosnipata, road from Paucartambo to Santa Ysabel.

The road ~~starts~~ crosses Paso de Acanacu at 3900 m. in puna with sparse brush. Soon patches of forest are reached, and at about 2600 m. all cleared land is left behind, except that roadsides are cleared. The valley is solidly wooded below.

The two species of Cinchona are growing commonly together, but no evidence of hybridization was seen. This may be due to the lack of overlapping to any degree of their flowering seasons. The narrow leafed one had fruits only a few buds and one open flower, while the broad leafed one was just coming into flower.

The narrow one is certainly connected with

the purple flowered northern ones, though the flowers are red almost as in the Ecuad. C. pubescens.

At Santa Ysabel is another Cinchona, locally called "calisaya" (28355). Apparently no large quantities were harvested here during the war. (Owner of S. Y. says much was exported, all of it "calisaya" which here is Ladenbergia magnifolia (28355). This is hardly likely but should be checked

Above, near where the R. Yanamayu & R. Mayutambo unite to form R. Cosnipata are 2 other Cinchonas, one a Ladenbergia magnifolia type with leaf blades decurrent on petioles, the other a Cinchona pubescens (?) type similar to that of Quillabamba, also with leaf blades decurrent. The pink flowers of this have no odor!

1947 Peru

✓ Aug. 7 - Valley of Rio Cosnipata just above Santa Ysabel road cut in wet forested region

2-8359 Lycianthes
rare
1
2 60 Besleria
common

P

done I

✓ (108) Aug. 7 - Rio ~~Marcapatambo~~ Tambomayo, just above where it joins the Rio Yanamayu to form the Rio Cosnipata 1800 m. (a) dense wet forest with tangled underbrush on remnant of old alluvial fan with huge boulders

3 61 Chusquea

12 G 62 Cinchona (Ladenbergia)

21 G2 63 Cinchona pubescens var.

I

Cuzco - Paucartambo

flower green, campanulate. leaves thin-fleshy, pale beneath, veins red; flowers brilliant vermillion, oblique.

tangled masses, climbing; most plants fruiting or just past fruiting here. "zara zara".

tree 12 m. tall, 14 cm. thick; bark only somewhat bitter; fruit immature. (bark sample E)

tree 10 m. tall, 10 cm. thick; flowers deep pink, odorless; fruit immature. (bark sample E)

1947 Peru

done ↓

(107) Aug. 7 Paso de Acanacu, ~~Cosnipata~~ headwaters of Rio Cosnipata

rocky roadsides on steep grassy slope 3800 m.

1 28364 Lycopodium
1 65 Asplenium
5 66 Jamesonia
common locally
5 67 Jamesonia
common
68 [illegible]
rare

(112) Aug. 8 – Cuzco, ruins of Sacsahuamán and canyon below ruins

13°31'S
71°59'W

dry grassy hills
5 69 Gnaphalium
canyon walls, common
1 70
dry canyon walls, rare

1 71 Oenothera
rare on dry canyon walls

Cuzco – Paucartambo – Cuzco

28364a Galium hypocarpium
vine-like; fruit orange, fleshy

erect.
erect.
strictly erect

erect.

shrubby tree 3 m. tall, flowers campanulate, yellow ocher dusted outside with purple.

branched sprawling herb, 1 m. long. (mostly dried up). leafless, stem bronze-purple, pedicels and ovary same; ~~co~~ perianth, red.
branched at base; flower orange, stigma deeply 4-fid, lobes spreading

1947 - Peru

2 28372 Grindelia
1 common on dry hills, mostly dried up
6 73 Senecio rudbeckiaefolius Meyen et Walp. det. J. Cuatrecasas
occasional on dry hills
5 74 Baccharis peruviana Cuatr. var. det. J. Cuatrecasas
occasional on dry hills
2 75 Daucus
between rocks in ruins
of temple
1 76 Apium
between rocks in ruins
of temple
3 77 Galium (Relbunium)
between rocks in ruins
8 of temple.

✓ (109) Aug. 9 - Río Huatanay, 1 km. 13°33'S
below San Sebastián, 7 km. 71°56'W
done ↓ e.s.e. of Cuzco 3400 m (c)
grassy salt flats and wet sandy
river bed.
4 78 Baccharis tricuneata v. lineata (Cuatr.) Cuatr. det. J. Cuatrecasas
common on banks and
raised places in grassy flats
1 79 Gentiana sedoides
occasional in very salty
places
2 80 Hypochaeris andina
common on wet grassy banks ~~along~~ river

Cuzco - Cuzco

flowers yellow.

branched sub-shrub,
flowers yellow.

prostrate

prostrate, purple; fruit
white, fleshy.

prostrate, gray-green

plant slightly glaucous,
somewhat fleshy. flowers
white or slightly lilac,
with green stripes outside
~~flowers~~ ligules white, tinged
with pink, outer ones purple-bronze without

1947 Peru

28381
5 common in wet sand and in running water
1 82 Spergularia
wet sand
83 Ruppia
in running water
1 84 Poa
in wet sand, rare.
1 85 Juncus
in wet sand
1 86 Cotula
in wet sand, common
1 87 Salicornia
in very salty flat, encrusted
with white powdery salt deposit
1 88 Juncus
very common in grassy flats
1 89 Plantago
in very salty place, encrusted
with white powdery salt deposits
1 90 Cotula
rare in grassy flat
1 91 Senecio
rare in wet sand
1 92 Galium
on dry banks around
edge of salt flat
↑

Cuzco - Cuzco

leaves smaller and narrower on sand than in water
forming small circular
mats; leaves fleshy; flowers white.
prostrate; fleshy; flowers
purple.
forming large masses,
immature, no fruit.
spreading tuft

spreading dense tufts

dense tufts; leaves
sub-fleshy.
fleshy; spikes terete
much thicker than stem,
red.

leaves bluish green;
bracts purplish, disk
yellow.
disk yellow

prostrate; leaves
purple; fruit white,
fleshy.

1947 - Peru

Cuzco - Urubamba - Calca

113

✓ Aug. 10 - Rio Vilcanota about half-way 72°11' W 13°17'S
[illegible] between Urubamba and Ollantaytambo,
↓ Prov. Urubamba, Dept. Cuzco
dry salt flat near river 2,800 m.
28397 Spergularia erect, fleshy; flowers white.
common, mostly dry or eaten by sheep.

✓ Aug. 10 Ollantaytambo Ruins, 72°17 W 13°15'S
Rio ~~Urubamba~~ Vilcanota
Prov. Urubamba, Dept. Cuzco.
dry rocky terraces of Incaic ruin 2800 m.
1 94 Nicotiana shrub 1-[illegible] m. tall; malodorous;
common, weedy, ~~[illegible]~~ leaves gray-green; flowers
light green, limb patent.
3 95 Nicotiana shrub 1-2 m. tall, malodorous
common, weedy leaves gray-green; flowers
light green, limb reflexed.
2 96 Tillandsia tufts, gray.
common on rock cliffs
2 97 Heliotropium leaves very rugose; flowers
occasional lavender.
4 98 much-branched, odorous
occasional suffrutescent herb; leaves
glaucous; flowers purple-black

✓ Aug. 10 - Pisac ruins, Pisac, 71°52W 13°27'S
Rio Vilcanota
Prov. Calca, Dept. Cuzco
crevices in stone walls of ruins 3250 m.
1 99 Solanum ripe fruit yellowish
28400 leaves glaucous, fungus-
2 infected.

1947 – Peru

28401 Conyza
1

1 02 Coreopsis
2 03 Drymaria

1 04 Eustephia

Aug. 11 – Leaving Cuzco by train, went down the valley of Rio Huatanay, then up the Rio Vilcanota. The lower R. Huatanay is a canyon with steep sides, covered by Puya and ~~othe~~ Cereus, as well as shrubs, with a flat floor. The R. Vilcanota is broader, with cultivated flats and salty grassy ones, some very wet. Eucalyptus is very commonly planted. Extensive salt flats below Sicuani. Valley lined by dry hills, cultivated wherever possible, steep slopes made less susceptible to erosion by half-terraces

Cuzco – Calca
– Canchis

flowers and bracts purple-tipped.
flowers yellow.
~~dry~~ plants almost dry, diffuse.
stems and ovaries bronze-purple, perianth red with yellow-green tips.

After Aguas Calientes, where there is a boiling spring of hot water, the landscape becomes pure puna, with scree slopes on the sides, the great chain of snow capped peaks at the left ending in the Nudo de Vilcanota. The vegetation is sparse bunch-grass with small ~~P~~ Pycnophyllum cushions between, these a golden-green. There is no cultivation here, though people are occasionally seen driving herds of llamas. To the left, near the top are frozen waterfalls. Patches of a gray Puya on slopes.

1947 Peru

✓ Aug. 1[illegible] - La Raya near top of pass bet. Vilcanota and Pucará drainages 71°1'W 14°30'S

4314 m. (?m)

puna, with several bunch grasses, wet in places and supporting large Distichia mats.

2 28405 Azolla
1 floating in ditch

3 06 Luzula
in grass cushion

2 07

common, ~~large dry tufts~~

2 08

common

2 09 Distichia muscoides
common flat more or less dry ground

I

On the Pucará side the descent is gradual through a flat valley. Here are white cushion ~~co~~ Opuntia, on the slopes patches of Puya. The floor is grassy and large herds of llamas, cattle and sheep are grazed on it. Apparently burning is much practiced

Cuzco - Canchis

puddles and ditches with Azolla, etc.

reddish, firm.

heads drooping.

large dry tufts.

short tufts

flat prickly but yielding cushion.

Near Santa Rosa a slight amount of cultivation begins. It is so slight as to be unimportant and does not increase much till after Ayavari. Even as far as Tirapata grazing seems much more important, esp. on the broad flat valley floor.

1947 Peru

Below Pucará the valley greatly broadens out until below Lano it becomes a wide grassy plain. Still grazing seems to be the main industry, except on rises, hills, & the surrounding slopes. The grass has in most places been grazed too close.

J

13

v Aug. 11 Juliaca, Pro. ~~Puno~~ San Roman, Dept. Puno 70°8'W 15°30'S

28410 Buddleja
6

cultivated in plaza

I

Vargas told me in Cuzco that Pycnophyllum is an important forage for alpacas.

Puno - Lampa - Puno

This continues to Juliaca, a bit more cultivated toward there.

In the plaza is an unusual species of Buddleia, with orange flowers, cultivated as an ornamental tree.

compact tree with round crown, 4 m. tall, 10 cm. thick; flowers deep orange. "kolla"

1947 Bolivia

Aug. 12 Guaqui, ~~[illegible]~~ port on Lake Titicaca

From the port toward the lake is a flat about 2 ~~ft~~ m. above the level of the lake. It is said locally that since 1930 the level of the lake has fallen that much. The top layers are a peaty black soil, but just above water level is a stratum of white clay of undetermined thickness.

La Paz, Oruro

Aug. 17 - Salt flats n.e. of Oruro, 3700 m. Basic vegetation a fine grass, prob. Distichlis, very closely cropped. Here and there, over large areas, the ground is partially covered by cushions of Pycnophyllum up to 0.5 m. across, variously distributed, sometimes 1 m. apart, sometimes almost confluent. In other places, nearer Oruro, are similar cushions of Atriplex (?), a prostrate species with short erect inflorescences a few cm. high. Toward the east grain is cultivated on this flat, ~~[illegible]~~ sown in rows - at this season only stubble. Scattered here and there are bunches of a quill-like grass, toward the east becoming abundant. Toward the east the cushion plants disappear, the soil becomes more sandy and probably less alkaline or saline. Still further east the cushion-plants reappear, incl. a cushion Opuntia (rare) The central cultivated ~~[illegible]~~ sandy part of this flat is slightly higher.

Still further east begins a grade up to the foot of the mountains. Here bunch-grass becomes dominant but with an important admixture of Baccharis (?) and several gray thorny plants, all dwarf-shrubs. This is near Paria (itself situated in a salty broad flat bottom of a ravine. A Nicotiana (?) is common along the embankments. Beyond Paria the grass becomes less abundant and the dwarf shrubs, esp. a legume ~~one~~ with forked ~~[illegible]~~ spines and tiny pinnate leaves, (28414) become dominant. The fine grass still forms a thin ground cover. The railroad here follows up a stream, on the side of its ravine. It is saline.

Near the stream the bunch grass is still abundant, varying locally. At 10 a.m. in bright sun there is still ice in places along the stream. There are still cushion-plants, esp. near the stream. The one that resembles Pycnophyllum may be Arenaria or something else of that sort. Upward the ravine-bottom broadens into a plain and is cultivated

Upward ~~toward [illegible]~~ s. of C. de Huallcas the flat bottom becomes narrow and almost bare gravel, while on the ravine slopes the dwarf shrubs become larger, more varied. The cushion Opuntia becomes more common, possibly more than one sp. Then the rr. enters a canyon, through rock portals formed of a hard westerly tipped almost vertical bed. In this canyon cushion plants dominate on flat benches, dwarf shrubs + grass on slopes, nothing on gravel stream bed.

1947 Bolivia

#28411 (Tola?) ~~[illegible]~~ becomes more and more dominant as higher altitudes are reached, ~~In the pass (4437 m.)~~ near Tolapalca (3904 m.). The vegetation is practically a mixture of bunch grass and ~~[illegible]~~ 28411, badly over-grazed by sheep and llamas.

16 Aug. 17 Tolapalca, Oruro 3906 m.
17°52' S
66°48' W

mixture of #28411 + bunch grass of several sp. on bench on ravine walls of decomposed rock

28411 Parastrephia lepidophylla (Wedd.) Cabrera det. J. Cuatrecasas
codominant

The gray spiny shrub reappears on the Cochabamba side of the pass. A mixture of grass and 28411 is continuous to Banderani (3998 m.). Here a small Astragalus, a [illegible](?) (28412), and a Perezia (?) become common. Here also is a saline flat covered by a close grass turf. In wet places Hypochaeris andina (?)

Oruro, — Cochabamba

above Tolapalca the slopes of the canyon become steeper and grass more dominant. On occasional flat benches 28411 is still dominant. In the headwaters ~~and~~ except in the pass (4437 m.) grasses take over almost completely. There are still cultivated patches. In the pass 28411 is still common.

all overgrazed

green dwarf shrubs up to 4 dm. resinous, flowers yellow, several plants represented.

is present. This region is overgrazed. The rocks are sedimentary beds, ~~and~~ strongly tilted and distorted. Down the canyon the scrubby vegetation becomes richer and near Cona Cona ~~[illegible]~~ small columnar Cerei appear. Also Solanum (28413) + Barnadesia.

dow ↓

✓ ⑦ Aug. 17 Cona Cona, Rio Arque

dry scrubby canyon ~~slopes~~ wall,

28412 Senecio pampae Lingsh. det. J. Cuatrecasas
2/ common

4 13 Solanum

✓ Aug. 17 Ventillas just below Cona Cona
Rio Arque

1 14

~~[illegible]~~ common on steep
wall of decomposed rock.

~~below~~ below Ventilla The canyon
floor becomes flat and
gravelly. Nicotiana
glauca appears on
benches and embankments.

✓ Aug. 17 Aguascalientes
Station, Rio Arque, Coch.
canyon with dry brushy walls

2 15 Cupressus
planted near rr. station

5 16 Salix
planted near rr. station.

3578 m. (m.)

erect, branched at base,
0.8 m. tall, flowers
yellow.

3578 m. (m)

shrub 1 m. tall, spines
mainly distal.

3352 m. (m.)

young trees 5 m. tall,
bluish green.

Trees 4 m. tall, weeping
habit.

1947 Bolivia

Below Aguascalientes Schinus molle appears on canyon walls. also Puya and a slender yellowish Cereus, as well as the thick one mentioned above. Nicotiana glauca is common. The vegetation is more luxuriant but still a dry scrub. Mutisia enters. Populus (Lombardy) Eucalyptus globulus, + ~~Salix~~ (28416) are cult. A red-purple fld. Scroph. (or Lab.) becomes common.

✓ Aug. 17 Tacopaya, on Rio Arque, Cochabamba

steep brushy canyon wall

3 28417 Cassia
occasional

2 18 Franseria
common

5 19 Schinus molle
common

5 20 Nicotiana glauca
common, esp. on small gravel flats.

Cochabamba

Salvia, Franseria (28418), Alonsoa (?), Cassia (28417), several compositae also become common, also Buddleia (?)

3148 m. (m.)

erect sparsely branched shrub.

straggling shrub, leaves grayish.

small tree 5 m. tall, with unpleasant oily ~~od~~ peppery odor when broken, fruit rims

fls. cream white

erect shrub 1.5 m. tall, leaves somewhat glaucous, flowers yellow.

1947 Bolivia

Below Chancalla the canyon gets drier and drier, but Schinus is still common on walls, with a ~~[illegible]~~ branched slender Cereus

Aug. 17 Colcha, Rio Arque

shale cliff, (nr. cut.)

28421 Stevia
rare

22 Stevia
common

23 Buddleia
occasional

↑

The Rio Arque is very saline & alkaline. Below Arque the bed is white-encrusted. Here the valley broadens, with alluvial fans covered by Schinus and still another branched slender Cereus. The bed is wide, flat, gravel and almost without vegetation.

at Arque lombardy poplar and the erect form of Salix Chilensis are growing together, planted, of course.
Above Colcha Platyopuntia first appears.

2809 BM (m.s.)
2773 m. (m.)

branched at base, 0.8 m. tall; flowers white.

much branched, weak; flowers pale yellow-green; bracts purple-tipped.

weak much branched hanging shrub; flowers burnt-orange.

Several Cerei are very common in the brush-covered walls of the canyon. What appears to be a small Prosopis is also common. Dodonaea appears below Orcoma at about 2,530 m. A Ceiba or other bombacaceous small tree with thick conical trunk & excurrent branching also appears here. Dodonaea soon dominates alluvial fans.

1941 Bolivia

Irpa-Irpa is on a great alluvial fan, dry + brushy, with cacti, Schinus, etc. Here the rr. starts to climb, up the broad valley of Rio Uechi, greener and more vegetated on its floor than that of Rio Arque. A Spondias (?) is prominent; also Prosopis. Near Buenretiro (2378 m) a Phragmites or Arundo is common along dry watercourses. (this is the station for Capinota). Above here the forest on sides and floor of valley is thorn-forest – Prosopis, Cereus, Schinus, etc. Along the river (much more water than Rio Arque) are Salix and small irrigated patches. The hills are bedded shale. In the branches of several Prosopis were seen what appeared to be unbelievably large tree snails, 3–4" long and half that thick, dull chestnut brown mottled.

Cochabamba

The hills above Chalamoco are dominated by a fairly large much branched Cereus, in places codominant with Prosopis. The river is alkaline or saline with broad salty bed and Distichlis flats.

Parotani (2450 m.) is surrounded by an artificial forest of Eucalyptus + Schinus, planted so regularly that a German must have done it.

Above here the valley narrows, the walls are brushy. Where the slopes are not too steep there are small trees. The bottom is of low woods, mostly Schinus. A red-fld. Tecoma here, too, + Cortaderia.

Upward the valley widens out again, the floor with Salix + Schinus + cult. Eucalyptus.

Here is Suti-Collo (2502 m.)

At Vinto the rr. crosses into the broad cultivated Cochabamba Valley (Rio Rocha)

1947 Bolivia

In the Cochabamba Valley, which is broad and flat, Eucalyptus is the most conspicuous tree.

The valley appears dry at this season, and has an aspect almost like Southern California, with dry hills surrounding a flat plain with alluvial fans.

Aug. 20 - Cochabamba to Totora by road. There is a long gradual climb through dry country, to an altitude of about 12000 feet, this in pure puna - bunch grass. On the way are a few patches of the dry thorn forest that may (acc. Cárdenas) have been the original vegetation of the region.

Before the puna is reached, and on the other side, from the puna down to Totora the commonest shrub or small tree is Polylepis sp. It does not form a close growth but is abundantly

There are many fruit trees, peaches, pears, & apples. but according to resident Americans only the peaches are good.

scattered. Its trunk becomes about 20 cm. thick, covered with a reddish, coppery, exfoliating bark. The trees reach 5 m. Leaves reduced to about 3 lflets.

Totora and the road camp at km.   near Monte Punco are about 2800 m. alt.

Wheat is the main product.

Toward Totora the bushy vegetation becomes more luxuriant, but is, of course, badly eaten by sheep.

1947 Bolivia

[illegible]

45 IV ✓ Aug. 21 - ~~Rio~~ upper canyon of Rio Huairamayu (Rio Montepuncu)
thick wet forest on steep slopes

2 8424 Barnadesia polyacantha Wedd. det. J. Cuatrecasas
6 common

6 25

common in brush in openings and near stream

26 Mutisia lanata R. & P. det. J. Cuatrecasas
occasional in brushy woods along trail near stream

3 27 Cajophora
occasional in brushy woods along trail

✓ Aug. 21 same, above Sihuenca

2 28 Siphocampylus
rare in brush on vertical bank above trail

4 29 Drymaria
along trail

30 Centropogon
common along trail

Cochabamba

2700 m. shrub 2 m. tall, arching; flowers crimson

somewhat aromatic shrub up to 2 m. tall; flowers very pale lavender to white. (looks like Hedyotis superficially). "Muña" used for flavoring foods in place of Origanum

vine climbing in small trees; heads ascending, rays vermillion.

vine; ~~flowers~~ not stinging; flowers orange-red.

2600 m.

~~[illegible]~~ vine-like; corolla red, column yellowish, anthers gray, stigma greenish.

decumbent, dull-green herb.

shrub, flowering from 1 to 4 m. tall, sparsely branched; flowers pale green except brownish anthers, faint, elusive skunk-like or fox-like odor.

1947 Bolivia [illegible]

v 8431 Nicotiana
v common along trail

v 32 Senecio cabrarae Cuatr. det. J. Cuatrecasas
common along trail

DET. P.E. Berry, 1998
4 33 Fuchsia boliviana Carr.
common along trail
2 34 Nertera granadensis
common on open banks

v Aug. 21 - same, Chaccatume,
just below Sihuenca
2 35 Fuchsia juntasensis O. Kuntze
brushy banks DET. P.E.
Berry, 1998

1 36 Smilax
~~flowers~~ brushy bank
3 37 Monnina
rare along trail
see below
7 38 Nertera granadensis
common along trail and
under trees
7 39 Corynula
abundant all along
trail
40 Corynula
same

C. Cochabamba

2600 shrubs up to 5 m. tall.
flowers white tinged with
bronze-purple.
shrub or small tree
5 m. tall; rays white,
disk dull whitish.
shrub up to 4 m. tall;
flowers pendent, crimson.
prostrate; fruits
red, juicy.

v 2500 m.
weak, elongate sparsely
branched shrub, leaves
just appearing; flowers
pendent, purple.
small vine; flowers
maroon with yellow anthers.
flowers purple.

2400 m prostrate; fruits bright
red; flowers yellowish
green.
prostrate, forming a
carpet; flowers deep
purple, ♀.
same flowers ⚥

1947 Bolivia

✓ 28438-40 go here Aug. 21 Same, Arechu Quebrada

brushy forest along river

28441 Cinchona pubescens var.

12 occasional, in small groups a "manchas"

1 42 Monnina

occasional

1 43 Palicourea

rare, along trail

1 44 Psychotria

rare, in shady undergrowth

1 45 Fuchsia

common

1 46 Peperomia

rare along base of cliff, by trail

5 47 Physalis

local at base of cliff.

Cochabamba

2400 m.

tree 10 m. tall, trunk inclined with erect branches, trunk 20 cm. thick; leaves dull above, veins and petioles green, scarcely reddish; stipules erect, green; flowers crimson without, lobes pink within, very fragrant; fruits reddish. (bark sample from erect branch.)

shrub 2 m. tall, leaves dark green; flowers deep indigo blue with yellow-green back.

erect shrub 1.5 m. tall; thyrse blue-violet, flowers blue.

erect, 1 m. tall; fruit white.

weak shrub to 4 m. tall, tending to be supported by other plants; flowers vermillion.

fleshy, odorless; spikes erect.

herb 1.5 m. tall, branched; flowers greenish white.

1947 Bolivia [illegible]
[illegible] fruit along river

28448 Siphocampylus
2 rare on cliff by waterfall

7, 49 Cinchona pubescens var.
occasional, this on vega
of river.

7 50 Clusia
occasional on cliffs
above trail

4 51 Cinchona
occasional in woods
on walls of ravine above river

10 52 Cinchona
same

Cochabamba

2400 m – vine-like; flowers vermillion
with orange-yellow lobes,
column yellowish, anthers gray.
– tree with several
trunks, up to 12 m. tall,
30 cm. thick; leaves
dull to subglossy above,
veins and petioles green
to somewhat reddish,
stipules green, erect;
fruits immature, reddish.
(bark sample)
– lactiferous shrub,
latex white; fruits
cream-white.
– tree 8 m. tall, 1 dm. thick,
several small trunks;
leaves dull, slightly
iridescent above, veins
and petioles scarcely
reddish; stipules som reflexed
~~[illegible]~~ slightly persistent;
fruits reddish, immature
(bark sample.)
– tree 4 m. tall, ~~[illegible]~~ 6 cm. thick,
branched at base; lvs. same.
turning red when old. (bark sample)

✓ Aug. 22 – Montepunco,

brushy slope, mainly Polylepis, Gerardia, Baccharis, Piqueria, gaiadendron etc.

28453 Gaiadendron
5 common

3 54 Baccharis tricuneata L. f. var.
det. J. Cuatrecasas
common

1 55 Piqueria
common

3 56 Polylepis tomentella Wedd.
dominant

5 57 Gerardia
common

The two Cinchonas found along Rio Huairamayu are growing together, but show no signs of hybridization. Both seem to be varieties of C. pubescens. One is more or less the sort found in the countries to the north, with large leaves, somewhat decurrent on the petioles,

shrub 2 m. tall; flowers white, turning dull straw-yellowish, fragrant.

bush 1 m. tall, flowers yellowish-white.

bush 1 m. tall, past flowering.

shrub 3 m. tall, with papery red exfoliating bark.

shrub 1 m. tall (others taller); flowers rose-purple, orange inside, stamens yellow.

red, green stipules, early caducous, crimson fragrant flowers. The other has smaller, narrower pointed leaves, stipules more persistent and early reflexed. The flowering seasons may be distinct enough to prevent crossing. (The second var. (28451, 28452) resembles more the northern forms often referred to C. off.)

1947 Bolivia

all [illegible] ↓

✓ Aug. 23 - Inca Chaca, valley of Rio Malaga,

thick wet forest on ~~the~~ and near top of bluff

23458 Fuchsia
3 occasional in undergrowth near trail on steep slope

2 59 Fuchsia
occasional in second-growth brush on steep slope

3 60 Calceolaria
common in undergrowth on steep slope

5 61 Vaccinium
occasional in thin woods at top of bluff

14 62 Cinchona
occasional in ~~[illegible]~~ decadent woods at top of bluff

5 63 Cinchona
same

Cochabamba

2500 m. (e.)

shrub 1.5 m. tall; flowers in pendent racemes, hypanthium dull flesh-bronze, corolla red.

shrub 1.5 m. tall; flowers scarlet.

scrambling herb up to 2 m. long; flowers yellow.

semi-scandent, probably epiphytic

small tree 4 m. tall; 3 cm. thick leaves badly eaten by a hairy lepidopterous larva, deep purple beneath, dull green above; fruits reddish green. (bark sample)

small tree 5 m. tall, 4 cm. thick; leaves dull green above, bronze-purple beneath; fruit greenish. (bark sample).

~~#~~1947 Bolivia

28464 Palicourea
4 occasional at top of bluff
1 65 Mikania
occasional in forest on
top of bluff
1 66 Cinchona
occasional in woods
at top of bluff

67 Cinchona
rare (this form) in woods
near top of bluff

1 A wide forested bench
about 75 m. above floor
of valley, has Cinchona on

1 68 Fuchsia
occasional at top of bluff
3 69 Corynula pilosa
common along trail

Cochabamba

shrub 2.5 m. tall;
fruit immature.
vine, flowers white.

sterile sapling 4 m.
tall; leaves dull green
above, purple beneath
(bark sample).
tree 12 m. tall, 25 cm. thick;
leaves dull green
above and below; buds
(rare) crimson-pink outside;
fruits ~~[illegible]~~ reddish-
bronze. (leaves badly
eaten by a hairy lepidopterous larva) (bark
sample)

cliff, but not on flat top
except near edge. Two forms,
one with leaves green, the other (more
common) purple, beneath.)
practically leafless,
flowers purple, pendent.
prostrate, forming a
carpet along trail; flowers
⚥, green (mostly sterile)

1947 Bolivia

2 Aug. 24 same

wooded sides of deep ravine of river cut in flat bed of valley. Second-growth brushy woods, with Escallonia, Myrica, etc.

28470 Baccharis venosa (R.& P.) DC. det. J. Cuatrecasas
6 common on steep rocky slopes

7 71 Borreria.
weedy side of trail

7 72 Escallonia
common on steep slopes

7 73 Myrica
common on steep slopes

5 74 Clethra
occasional on steep slope

2 75 Gaultheria
common in brush on ridge

1 76 Arenaria
common along trail

5 77
rare on vertical earth bank

5 78 Gaultheria
common in brush on ridge

Cochabamba

2300-2400 m.(?)

This valley seems to have been rejuvenated twice, leaving broad benches both times. The bottom of the ravine ~~[illegible]~~ is a narrow twisted gorge only a few m. wide, through which the river rages, carving the compact sedimentary rock into bizarre forms.

erect bushy herb 1 m. tall, very bitter, said to be used as remedy for fevers.

erect, up to 1 m. tall, flowers white.

small tree 4 m. tall; flowers white.

shrubby tree 4 m. tall.

shrub 1.5 m. tall.

shrub, up to 0.6 m. tall; flowers pink; fruit black.

prostrate; flowers white, petals entire.

short scandent; ~~[illegible]~~ spathe greenish yellow, spadix green, turning yellowish.

shrub up to 0.4 m. tall; flowers pale pink. fruit black

1947 Bolivia
in steep [illegible]

28479 Sisyrinchium
2 occasional on steep ridge

7 80
common

1 81
rare

2 82 Galium hypocarpium (L.) Benth.
rare on steep ridge.

7 83 Fuchsia
occasional on steep slopes

2 84 Cinchona
occasional on steep slope
just above rim of gorge.

5 85 Vernonia
common in brush along trail

15 86 Fuchsia
common in brush along trail
and near electric plant

6 87 Fuchsia
common in brush near
electric plant

Cochabamba

caespitose, erect; flowers
yellow, ephemeral.

suffrutescent herb or
shrub up to 2 m. tall;
rays bright deep yellow,
disk dark brown.

shrub 0.3 m. tall; flowers
scarlet.

vine-like, 2 m. long, climbing
in bushes; fruit orange, fleshy.

erect shrub, up to 1 m. tall;
flowers scarlet-vermillion.

Tree 10 m. tall; leaves dull,
green above bronze-purple beneath,
~~tree in~~ stipules soon reflexed;
(tree in fruit, leaves badly
eaten by insects; only
specimens secured were from
trunk-sprouts, as others
fell in river) (bark sample).

scrambling shrub,
flowers purple, heads
secund.

erect shrubs 1.5 - 2 m. tall,
(specimens from several); flowers
deep crimson; fruit very large.

erect shrubs 2 m. tall;
flowers in pendent corymb
racemes, dull crimson;
fruit black, glossy.

1947 Bolivia

same.

✓ Aug. 24 - slopes above electric plant (brought in by local people

28488 Cinchona
occasional in woods.

3 89 Tropaeolum
occasional

✓ Aug. 24 - steep side of valley near head of Rio Málaga, above Incachaca, steep, wet thickly wooded slopes, cloud-forest.

90 Nertera granadensis (L.f.) Druce
common on banks and cuts along trail

91 Centropogon
rare on steep slopes

92 Galium
↑ rare on vertical bank

Cochabamba

leaves green beneath; with reddish veins, stipules reddish when reflexed.

vine with flowers firm, waxy in texture, crimson-magenta, with maroon scales (petals?) in mouth; fruit green, very pungent to taste.

These slopes are of schist. They have no cinchona, as far as seen
3900 m. (?) and few Rubiaceae except Galium & Nertera.

prostrate, flowers greenish-yellow, fruit scarlet, juicy.

shrub, branched from near base, 1.3 m. tall; calyx bronze; corolla dull red, column red, anthers blackish with purple hair, stigma dull pale greenish.

prostrate.

1947 Bolivia

40

✓ Aug. 27 – slopes west of La Cumbre, Prov. La Paz 4500 m.

"puna" ~~–~~ dry meadows

28493 Wernería — dense, ^best flat^ cushion plant, fls. white

5 94 Pycnophyllum — dense soft cushions.

common

✓ Aug. 27 – same, east of La Cumbre Prov. ~~Nor~~ Nor Yungas 4600 m.

puna, ~~[illegible]~~ loose shale slopes.

5 95 Stipa — dense tufts

common

3 96 Stipa — dense tufts

common

2 97 — tufts.

common

3 98 Pycnophyllum — soft ^flat^ cushions

common locally

1 99

~~[illegible]~~ occasional

28 500 Senecio adenophylloides Sch. Bip. det. J. Cuatrecasas — dwarf, much branched shrub, flowers dull yellow.

common

1 01 — tufts.

occasional

✓ Aug. 27 Unduavi, Rio ~~de Tongo~~ Unduavi ~~Nor~~ Nor Yungas 3100 m. 16°16' S 67°55' W.

steep rocky slope with sparse brush

1947 Bolivia

(39)

28502

2 common

03 Gaultheria
common

(57) Aug. 27 – Chuspipata, Rio
Coroico
road cuts on steep cliffs

4 04 Nertera granadensis
common

2 05 Lycopodium

Aug. 27 – Rio Coroico, Valley of Cupulani drainage, below
Chuspipata, Pr. Nor Yungas
Wet brushy woods on steep
slopes.

06 Symbolanthus
in dense brush

4 07 Cinchona
side of trail

Aug. 27 – Sacramento Chico,
Valley of Cupalani, Rio Coroico
drainage Nor Yungas
side of brushy wooded ravine

08 Cinchona

"Quina paile" or

Nor Yungas

suffrutescent herb up
to 1 m. tall; flowers deep crimson
shrub 2 m. tall

prostrate; flowers
yellow, fruits red, juicy.

2000 m.

shrub 1.5 m. tall,
flowers a beautiful rose,
marked with whitish.
sapling 1 m. tall, sterile,
"quina naranjada" leaves
more or less glossy above.

1900 m.

sprouts from old stump, 4 m.
tall, flowers pale pink, very fragrant.
"paile paile" leaves deflexed. fruit
immature (bark sample)

1947 Bolivia

√ (56) Aug. 27 – Rio Coroico, 5 km. above Coroico, Prov. Nor Yungas

steep brushy side of valley

27509 Cinchona calisaya var.
6 in brushy ravine

"quina calisaya lanuda"

10 Cinchona calisaya var.
brushy slope. common

√ Aug. 27 – 4 km. above ~~Coroico~~ Coroico ~~at~~ in valley of Rio Coroico. Nor Yungas

steep walls of valley around banana plantation

11 Cinchona calisaya var.
planted abundantly

The drainage of Rio Coroico well above Coroico is wet, steep walled and densely wooded. The rock seems to be sedimentary. The road from La Paz enters the valley above Chuspipata, at about 3000 m.

Nor Yungas

1750 m.

slender shrub 4 m. tall. (like 27510 but hairy) (leaves badly attacked by insects) (bark sample.)
shrub 3 m. tall, several stems from base, leaves turning red. (bark sample – lower bark had been removed and regrown)

1700 m.

shrubs 2 m. tall, fruiting

in a zone of elfin forest and Chusquea. This rapidly becomes typical dense cloud forest. At least near the road this is fairly well choked with Chusquea and vines, probably the result

of the road construction.
At about 2100 m. appears a variety of Cinchona pubescens. Young plants are very common in the brush along the road, but mature ones rare – only two seen (   ). It is probably C. ovata Wedd. or something close to it. It differs from the Cochabamba form (28484, 28488, etc.) in the erect, early caducous stipules, glossy leaves, etc. At about 1900 m. this is replaced by another variety of C. pubescens ~~&~~ "quina paile" which has long leaves, acute at both ends, tending to be pendent or deflexed, coarsely pubescent. No large plants of this were seen, but some small ones were flowering.

Near where Cupilani valley enters the main Coroico valley, the forest disappears, having been cleared and burned, replaced by coca and banana

plantations and second-growth brushy slopes. In this brush C. calisaya is frequent as small bushes, up to 4 m. tall. It occurs both as a smooth and a tomentose form, otherwise more or less identical.

Around banana plantations this has been largely preserved and abundantly planted. There are small trees, flowering and fruiting abundantly when only 2–3 m. tall – probably because they are out in the sun. Besides the tomentose "quina calisaya lanuda" form mentioned above, local quineros recognize a "quina calisaya blanca" with smooth green leaves and pink flowers, and a "quina calisaya morada" with leaves purple beneath and white flowers. The leaf shape varies considerably, but is generally narrow and with an obtuse apex. All are harvested and considered more or less equal in bark quality

1947 Bolivia

It was noticed that flowering plants were much easier to peel than fruiting ones, and this was confirmed by

✓ Aug. 28 – Coroico, Nor Yungas
planted in and around edges of banana plantation on slope.

28512 Cinchona calisaya
5 common

15 13 Cinchona calisaya
common

8 14 Cinchona calisaya
uncommon, edge of ravine

3 15 Cinchona calisaya

Nor Yungas

the quinero who served as guide.

16°9' S
47°45' W.

shrubby tree 2.5 m. tall; flowers fragrant, pink outside, pale shell-pink within. "quina calisaya blanca". name, ~~but without fl.~~ ~~and with immature fruit~~. (bark sample)

shrub 3 m. tall, several stems; leaves bronze-purple beneath, flowers said to be white, but not seen; fruit immature. & "quina calisaya morada" (bark sample).

shrubby tree. 3 m. tall, very heavily fruiting, most of leaves red, ready to fall. ~~Trunk~~ ~~Some~~ bark has been removed some time back "quina calisaya blanca" (bark sample)

1947 Bolivia

28516 Cinchona calisaya
1

17 Drymaria cordata
along ~~trail~~ at base of wall
18 Cinchona calisaya

✓ (57) Aug. 28 - valley of Cupulani,
below Chuspipata, Rio Coroico
drainage, Nor Yungas
wet cliffs and dense
Chusquea filled forest.
5 19 Deeringia
20 20 Cinchona pubescens var.
~~in~~ on steep side of ravine

5 21 Centropogon
steep brushy cliff

4 22 Fuchsia
wet cliff
5 23 Fuchsia
wet cliff and ravine, common

Nor Yungas

shrubby tree 2.5 m. tall,
flowers pink without,
pale shell pink within.
flowers white.

shrub 2.5 m. tall; leaves
green, fruit immature.
"quina calisaya blanca".

vine climbing in trees
tree 12 m. tall, 25 cm. thick;
leaves glossy, oldest
ones turning red.
"quina naranjada" (bark samp
scandent; flowers
magenta, column greenish
yellow, anthers black.
pendent shrub; flowers
crimson.
elongate shrub; flowers
scarlet.

$ 1947 Bolivia

all dup ↓

✓ (59) Aug. 28 – high on side of Valley of Río ~~de Zongo~~ Unduavi, road to Coroico, 8 km. below Unduavi
Nor Yungas
vertical road cut in brushy vegetation

28524 $ Gaulthenia
common

✓ 25 Vaccinium
very common

4 26 Gaultheria
very common

27 Pernettya
common

↑

✓ (66) Sept. 4 –
all dup ↓
pass at head of Quebrada de Zongo
great granite rocks with patches of soil between them, thin scattered snow on ground. Vegetation typical puna, with thin grassy turf, some tufted grasses. Also cliff with granite talus.

28528 Valeriana
2 rock crevices and ledges

1 29 Lupinus
rock crevices, rare

16°15' S
67°47' W
3000 m

small shrub, racemes red, flowers rose pink.
prostrate, flowers deep rose red.
shrubs from 1 dm to 8 dm. tall, flowers purplish pink, fruit black.
dwarf shrub, fruits pale purple.

5190 m.

flowers purplish white

1947 Bolivia

27530
common in rock crevices
3 31 Distichia
on gravelly paches of
decomposing granite
2 32
patch of earth between rocks
2 33 Pycnophyllum
common on earth patches
1 34
1 in rock crevices
1 35
rock crevices with earth
3 36
common everywhere
1 37
common locally
2 38 ~~[illegible]~~
occasional
1 39 Luzula racemosa Desv. det. Balslev. 1984
common in open
1 40 Cerastium
occasional on cliff
1 41
common locally
4 42 Luzula
common on cliff and talus
2 43 Luzula racemosa Desv. det. Balslev. 1984
rare on cliff

---

tufts and cushions

dwarf-shrub; flowers
dried.
flat yellow cushions

forming turf

flowers white

dense tufts

1947 Bolivia

23544 Stipa
3 ~~[illegible]~~ granite talus
2 45 Silene
rare on cliff
46 Chersodoma antennaria (Wedd.) Cabrera det. J. Cuatrecasas
occasional on cliff
5 47 Senecio adenophylloides Sch. Bip. det. J. Cuatrecasas
common on talus

1 2 48 Stipa
1 common on talus
1 1 49 Lycopodium
rare on cliff
1 2 50 Bomarea
rare on cliff
1 3 51 .
common on cliff
2 1 52 Asplenium
in crevice under overhanging
1 rock
5 53
. common on cliff

(61) ~~Aug~~ Sept. 2-3 - Quebrada de
✓ Zongo 2-4 km. above Zongo
steep wet wooded
canyon side.
3 54 Escremis
rare

---

dense bunches

flowers red

prostrate, matted

shrub up to 4 dm. tall,
bushy, ~~[illegible]~~ aromatic
flowers yellow.
dense stiff bunches

flowers coral red with
green tips.
dense bunch

forming dense cushions

flowers purplish blue;
fruit immature

1947 Bolivia

18555 Myrsine
5 bushy trail-side
2 56 Fuchsia
~~shrub~~ bushy trail-side

5 57 Palicourea
wet bushy trail-side

58 Gaultheria
~~dry~~ open bushy slope
1 4 59 Vaccinium
open bushy slope

2 60
1 common along bushy
trail-side
3 61 Phyllanthus
rare along trail
2 62 Galium hypocarpium (L.) Benth.
rare along trail
5 63 Siphocampylus
occasional in brush
along trail.
8 64 Cinchona pubescens Vahl var.
common locally

---

shrub 3 m. tall

shrub 1 m. tall,
flowers pendent coral-
vermillion with greenish-
tipped calyx-lobes
shrub 1.5 m. tall;
thyrse pale greenish,
flowers straw-yellow
shrub 1 m. tall;
flowers rose pink; fruit black.
shrub 0.6 m. tall;
flowers red with
white tips.
vine-like; flowers
and bracts white.

slender shrub 0.8 m.
tall.
vine-like; flowers
dark red, fruit orange-red.
sprawling shrub; flowers
red

small tree 5 m. tall;
leaves turning red in age, more
or less glossy; fruit dry.
(leaves variable in size
on different trees, this one small.)

-~~4~~ 1947 Bolivia

28565 8 Cinchona pubescens var.
canyon bottom

✓ Sept. 4 – Zongo

28566 7 Cinchona calisaya
planted in banana patc,
on steep slope (from plant
in forest below).

67 Drymaria
1 ↑ weed in village, common

E ✓ done ↓ Sept. 5 – La Paz, Bolivia
Cultivated in parks and gardens

1 4 68 Cantua buxifolia

4 69 Cantua buxifolia

c 70 Cantua buxifolia

1 71 Lavatera assurgentiflora Kell.
commonly cultivated and
spontaneous in gardens.

---

tree 12 m. tall; leaves
more or less glossy;
fruit damaged by insects.
(bark sample)

1300 m.

tree 8 m. tall, 12 cm. thick;
flowers pink, mostly sterile
(bark sample)

diffuse; pedicels viscous

erect shrub, flowers
"cantuta" yellow, limb paler than tube;
stigma exserted from bud.

erect shrub; flowers
with orange-red tube
"cantuta" and crimson limb,
stigma exserted from bud.

erect shrub 2.5 m. tall
flowers crimson, tube
redder than limb, (more
slender than in nos. 28568-9)
"cantuta".

shrub 1.5 m. tall, trunk thick;
flowers rose with white
center and maroon stripes.

1947 Bolivia

2 28572 Liqustrum
2 commonly planted

2 73 Cassia tomentosa L.f. det Powell
Senna multiglandulosa (Jacq.) I & B. det Barneby
planted and spontaneous

~~74 Vesoma~~

4 74 Veronica
commonly planted

5 75 Buddleja
commonly planted (apparently native to region)

6 76 Lavatera assurgentiflora Kell.
spontaneous in garden

✓ (63) Sept. 6 - ~~Rio~~ Canyon of Rio La Paz, 1-2 km. below La Paz,
cliffs and steep slopes of partially consolidated gravel, seriously eroded.

5 77 Tecoma arequipensis (Sprague) Sandwi. det. A. Gentry 1974
common

6 78 Tecoma arequipensis (Sprague) Sandwi. det. A. Gentry 1974
common

7 79 Prunus serotina var.
occasional

---

small tree 4 m. tall;
buds white.

small tree 3.5 m. tall;
flowers said to be yellow.
pods said to be eaten
occasionally, as they are sweet.

shrub 1 m. tall; flowers
purplish at first, turning
white.

shrub 2 m. tall (but
reaches small tree size);
flowers orange.
"kishuara"

shrub flowers rose-pink
with white center and
maroon stripes.

shrub 2 m. tall, sparsely
branched; flowers dull orange-vermillion.

shrub 1.5 m. tall, sparsely
branched; flowers dull orange-vermillion

Tree 6 m. tall; flowers
white; fruit immature,
said to be very sweet and
edible when ripe.

Bolivia 1947

2 8580 Cassia tomentosa L.f. det. Powell
6 common Senna multiglandulosa (Jacq.) I & B det. Barneby

5 81 Oenothera rosea
occasional

1 82 Matricaria chamomila
occasional weed

4 83 Senecio clivicolus Wedd. det. J. Cuatrecasas
common

1 84
common at base of slopes

1 85
occasional on dry talus

1 86
weed at edge of cultivated field

3 87 Mutisia acuminata R. et P. det J. Cuatrecasas
common

6 88 Muhlenbeckia
common

↑

---

shrub 1.5 m. tall, flowers yellow; fruit immature.

prostrate, branched at base; flowers rose-purple.

~~xx~~ aromatic. rays white, disk yellow. "manzanilla" used medicinally.

branched low shrub; flowers bright yellow. erect to tangled.

flower yellow with a green stripe outside each segment, wider on outer segments.

leaves green, fleshy; flowers green.

low shrub, up to 1 m. tall, rays vermillion, bracts black-purple. "chinchiricona".

low weak shrub; flowers green, ripe fruit black, fleshy, used for coloring fabrics.

Sept. 7 – trip by air from La Paz to Oruro, Cochabamba and Santa Cruz.

To Oruro is mainly over altiplano – dry, bare and almost completely under cultivation except where ~~[illegible]~~ there are alkaline or saline flats, or where erosion has formed dendritic patterns of gullies.

From here east to Cochabamba and far beyond are range upon range of dry, brown, bare hills, also largely under cultivation or overgrazed.

Finally, to the eastward, the hills begin to darken with a thin brush that indicates the approach of the wetter eastern slopes. Then comes a broad band of completely green lower hills, obviously

all [illegible]

75

78589 Sept. 7 – Santa Cruz, Dept. de Sta Cruz
Datura
cultivated in park

formed of warped and eroded sedimentary beds densely wooded on all except the broken off steep faces which show their pink and dark bedding through a thin grassy or bushy vegetation. The crests of the ridges are largely brush-covered rather than wooded, too.

This flattens out into the plain on which Santa Cruz is situated. This has largely been denuded though just east of the hills is an expanse of palm forest. Second-growth woods is common, though most of the land is cultivated.

/ calyx circumscissile, prismatic, slightly plicate; bushy shrub 2 m. tall; flowers white, open only at night "ciego de la noche."

Bolivia 1947

28590 Diastatea
1 weed with potted plants
2 91 Apium
weed with potted plants
4 92 Cestrum
~~vine~~ climbing on pergola in arbor, probably planted
1 93 Gnaphalium
weed with potted plants
↑

The cultivated plants of Santa Cruz are the common tropical ones. Particularly noted were:

Washingtonia filifera
Phoenix sp.
Datura sp. (28589)
Melicocca bijuga
Citrus (various spp.)
Eugenia cauliflora
(delicious black fruit the size of a large cherry)
Murraya paniculata
(called Jasminum officinale)
Plumbago auriculata
Cestrum sp. (28592)
Enterolobium cyclocarpium
Monstera sp.?
Cycas revoluta (one garden)

Santa Cruz

flowers purplish

vine several m. high; fruits black.

Cordyline terminalis
a large yellow bamboo.
Mangifera indica
Persea americana
Ficus pumila
Cochlospermum sp.?
~~Co~~ Ceiba sp.? (bottle shaped)
Zebrina pendula
Acrocomia sp.?
Catharanthus roseus
Plumeria rubra
Cecropia sp.
(fruit said to be delicious and tree free from ants)
Musa sapientum
Codiaeum variegatum
Asparagus plumosus
Asparagus sprengeri
Cupressus sempervirens
Crinum rubrum
Carludovica palmata

Sept. 8 - Trip from Santa Cruz to Bermejo, up Rio Piraí
Flat sandy plains with tall second-growth brush, with Tecoma very conspicuous, also a green-leafed, shrubby white-flowered Solanum and a Serjania. Cereus peruviana(?) occasional. Many other shrubs and vines. The sand appears to have very little humus in it. Approaching the mountains palms become very abundant, finally the dominant note in the [illegible] vegetation. Also scattered tall trees appear, apparently left in clearing. Cultivated plots are scattered.

After passing the first range of hills the road is in a broad river valley, and the palms disappear. The forest becomes drier and dominated by legumes.

Patches of tall trees are common here. The hill slopes become covered by what appear to be deciduous trees just starting to leaf out. For a while the valley is quite dry. At about Angostura it becomes wetter and Cecropia becomes common. But it is still rather dry forest in most places. Several large Solanums, Urera laciniata, several malpighiaceous vines, Tecoma, etc. besides various leguminous shrubs and trees are common. Beyond Angostura the terrain is hilly, of a soft pink and white conspicuously bedded sedimentary rock, the beds varying greatly and much warped.

1947 Bolivia

box I

1 (48) Sept. 8 - Bermejo, valley of Río Piraí (Río Bermejo)
~~A~~ weedy brushy bluff of sediments over ravine of river.

28594 Tecoma stans
7 occasional in fence-row

6 95 ~~Lippia~~ Aloysia virgata var. elliptica (Briq.) Mold. det. Moldenke
~~[illegible]~~ common in brush

3 96 ~~Abutilon~~ Gaya calyptrata H.B.K. det. Fryxell
1 common weed

5 97 Heliotropium transalpinum Vell.
common in brush

6 98 Lantana aristata var. cabrerea Moldenke det. Moldenke
1 occasional on bluff

4 99 Alternanthera flavogrisea (Urb.) Urb.
common weed in small openings on top of bluff

28600 Randia
6 occasional on top of bluff in brush

From here the hills seem uniformly wooded to the tops with the same type of deciduous forest, just leafing out. The lower slopes just

---

Santa Cruz - Florida

tree 6 m. tall; flowers bright yellow with fine red lines in throat.

shrubs 1 - 2.5 m. tall.

suffrutescent herb up to 0.7 m. tall.

shrubs 0.5 - 1.5 m. tall; flowers white.

weak shrub 1 m. tall; flowers pinkish white.

prostrate, rather dense.

shrub 2 m. tall; flowers greenish-white.

above the flat bottom are planted to bananas.

1947 Bolivia

28601 Solanum tripartitum Dunal
5 dooryard Det. H. Iltis
I

S. cf. radicans L.f. det. M. Nee, 1982

↓

(51) Sept 9 - Tres Cruces, above Bermejo, north of Río Piraí (Río Bermejo) dry second growth with open grassy areas on slopes and crests has been severely burned

4 02 Chicothamnus azafran Cabrera fma. intermedia det. J. Cuatrecasas
rare in second growth brush

4 03 Lippia dumetorum Herzog
common in low brush

5 04 Onoseris sagittata (Rusby) Rusby det. J. Cuatrecasas
in shade at foot of cliff

5 05 Calceolaria
wet seeps and cracks in cliff

3 06 Eupatorium
brushy ridge

Santa Cruz - Florida

prostrate, rooting at nodes, extensive, forming dense mat; flowers white; fruit immature, not spherical, wider one way than other. said to be used in medicine to remove meconium from new-born infants - pounded and used as infusion.

"melendre"
erect shrub 1.5-2 m. tall; heads brilliant orange.

slender aromatic shrub 1.5 m. tall; flowers white.

flowers magenta.

flowers bright yellow.

flowers bright purple, involucre tipped with deep purple.

1947 Bolivia

28607 Piqueria
8 common on brushy ridge

5 08 Gouania
occasional in second-growth

8 09 Cinchona pubescens var.
common very locally
on brushy ridge;
plants have apparently
survived severe burning

6 10 Cinchona pubescens var.
same

5 11 Justicia rusbyana Lindau det. D. Wasshausen 1969
on brushy ridge, common

3 12
common tree on slopes
and brushy ridge, but
mostly sterile.

3 13
rare on dry eroded slope

Santa Cruz - Florida

slender shrub up to
1 m. tall. flowers cream
white; very fragrant.

vine climbing in trees,
tough; fruit immature.

tree 4 m. tall, partly
dead, several small
trunks up to 7 cm. thick;
leaves firm, reddish
green, stipules erect &
spreading; fruits
dull red, immature;
(bark sample).

mass collection of several
sterile clumps of
sprouts, the tallest
1.5 m. (keep all.) (To show
lack of variation except
in leaf size.)

erect herb to 1 m. tall;
flowers white, with
2 folds in lower lip that
are striped with purple.

tree with thick corky
ridged bark; leaves
glossy; flowers waxy
white; fruit dry.

shrub 1 m. tall, nearly
leafless; flowers white.

1947 Bolivia

28614
1 occasional weed
5 15 Ruellia longipedunculata Lindau det. D. Wasshausen 1969
rare on eroded open slope
5 16
common on brushy slope

↑
(42) due
↓

Sept. 19' Bermejo
around dwellings
3 17 Borreria
uncommon in grassy place
5 18 Amaranthus hybridus L.
common weed

on weedy earthy terrace above river
5 19 ~~Abutilon~~ Gaya det. Fryxell
common weed
Gaya Kruziana Krapov.
det. L.J. Dorr Jan. 1997

1 20 Portulaca
occasional weed

1 21 Richardia brasiliensia Gomes det. [illegible] 1976
rare weed

~~Lat~~ Santa Cruz - Florida

flowers white.

subshrub up to 1 m. tall, flowers dull red, tube lighter.
shrub 1.5 m. tall, flowers purple, calyx grayish purple.
"higilla"

flowers white.

erect.

suffrutescent herb up to 0.7 m. tall; flowers white, delicate, with purple center, purple filaments, yellow anthers, red styles.
fleshy, flowers dull ~~[illegible]~~ pink with deeper center, about 1.5 ~~cm~~ cm. across; stamens about 10, red; style branches yellow, 5-6.
prostrate; flowers white corolla lobes 4-5.

1947 Bolivia

78622 Portulaca
1 occasional weed

1 23 Delilia biflora
rare weed ([illegible])

2 24 Boerhavia
occasional weed

1 25 Portulaca
rare weed

2 26 Borreria
common weed

3 27 Portulaca
locally common weed

6 28 ~~[illegible]~~ Jungia divaricata Rusby det. J. Cuatrecasas.
common along roadsides

3 29 Jacobinia brevispica Leonard det. D. Wasshausen 1969
occasional in brush

2 30 Clematis
in brush along road

Santa Cruz - Florida

fleshy; flowers clear yellow,
2 cm. across; stamens many
(over 25), yellow; style branches 6-7, yellow.

flowers yellow.

. prostrate to ascending,
flowers pink.

fleshy, flowers pale
straw yellow, ~~style~~ stamens
10-12, filaments yellow,
anthers orange-red; style
branches 6-8, yellow.

flowers white.

fleshy, leaves more or less
pressed into one plane;
flowers crimson-pink,
7-8 mm. across, stamens
about 15, red with yellow
anthers; style branches
6-8, deep crimson, twisted
into two irregular masses.

shrub up to 7 m. tall;
flowers white.

sprawling elongate
herb, flowers yellow
fading distally to straw color.

vine; flowers greenish
white.

1947 Bolivia

28631 Croton
4 common in brush

5 32 Graphalium
common weed

5 33 Senecio pectioides Rusby det. J. Cuatrecasas
road cut in earth

3 34 Tricachne insularis
common weed

5 35
common weed on earth banks

3 36
occasional weed

3 37 Physalis
occasional weed

1 38 Ageratum conyzoides
occasional weed

2 39 Urtica
occasional weed

According to subprefects of Samaypata there is quina in various localities around Samaypata. The trees are not necessarily small, but reach several dm. diam. In former times it was worked, at least to some extent

Santa Cruz – Florida

shrub 2 m. tall. ~~ff~~
leaves turning red in age;
fls. yellowish white.

branched suffrutescent
herb up to 0.8 m. tall,
flowers yellow.
loose bunches up to
1 m. tall.
prostrate, gray-green.

flowers yellow

flowers greenish yellow,
with dull green center.
aromatic herb, flowers
pale lavender.
branched herb, pale
green.

The small stature of nos. 28609-10 is doubtless due to burning. It is said only to grow on ridges and rocky places, never on flat places. Postrervalle, Miranda, San Juan were mentioned as localities.

1947 Bolivia

2 28640 Mikania
4
occasional in sparse brush

8 41 Solanum
occasional

1 42 Panicum
rare, growing up through a dense spiny sh

1 43 Rivina humilis
occasional weed

✓ (7+) Sept. 11 - gorge of Rio Bermejo (Rio Piraí)
about 1-2 km. above Angostura,
Pr. Florida, Dept. Sta Cruz
Cliffs of soft shale above
river, weedy roadsides
and cuts.

1 44 Plumbago
weedy roadside

6 45
~~[illegible]~~ on brushy cliff

4 46 Schinus
common in woods below road

2 47
common in brushy woods

1 48 Alternanthera
occasional on rocks

5 49 Ruellia graecizans Backer. (vel aff.)
common along road

Santa Cruz - Florida

herbaceous vine; flowers
cream white.

spreading tree 4 m. tall,
3 dm. thick; cymes erect,
flowers purple, nodding.

flowers pinkish white,
fruit red.

750 m

depressed plant, sprawling;
flowers white.

vine, flowers grayish
white.

slender tree 5 m. tall,
absolutely bare except for
clusters of green fruits.

extensive tough vine,
flowers bright yellow, one
petal marked with red.

heads whitish.

plants up to 1 m. tall; corolla
scarlet, somewhat plicate, bent at juncture of throat and tube.

1947 Bolivia

28650 Turnera
1 rare on rocks
2 51 ~~Sida~~ Wissadula boliviana R.E. Fries det. Fryxell
rare on rocks
3 52 Onoseris sagittata (Rusby) Rusby det. J. Cuatrecasas
I rare on rocks
all done ↓

✓ 35 Sept. 12 – Santa Cruz

3 53 Pogonopus tubulosus (DC.) Schum.
cultivated in park

1 54 Borreria
weed with potted plants
1 55 Nicotiana
weed with potted plants

✓ 65 Sept. 16 – Canyon of Rio Choqueyapu (R Chuquiagillo)
above La Paz
eroded steep dry grassy slopes of coarse gravel, dominated by Stipa, Baccharis, and in places Lupinus.
16°33'S
68°8'W.
3750 m

1 56 Solanum
common, mostly in moister places

Santa Cruz – Florida
~~La~~ La Paz – La Paz
flowers deep yellow.

bushy, up to 0.7 m. tall; flowers orange.
flowers bright purple.

Spreading tree 5 m. tall; flowers purple distally, green below, expanded calyx-lobe bright rose-pink.
"quina".
flowers white.

flowers green, slightly bronzed.

shrub 1 m. tall; leaves glossy, of a dull green color; flowers violet, fruit black when ripe.

1947 Bolivia

5 18657 Bacharis papillosa Rusby det. J. Cuatrecasas
common

2 58 Lupinus
common

3 59 Baccharis papillosa Rusby det. J. Cuatrecasas
common

1 60 Baccharis papillosa Rusby det. J. Cuatrecasas
common

1 61 Galium
rare on bare eroded gravel bank

5 62 Muehlenbeckia
common locally on
bare gravel

2 63
common

3 64 Tetraglochin
occasional

2 ♀ 65 Baccharis incarum Wedd. det. J. Cuatrecasas
5 ♂ 66 Baccharis " " " " "
very common

1

La Paz - La Paz

dwarf shrub; flowers
whitish.

small shrub; flowers
blue, with center of
banner bright yellow
turning to purple distally.
(mostly not yet in flower)

dwarf shrub. 0.5 m tall

dwarf shrub, 0.5 m. tall

prostrate, purplish;
fruit fleshy. white.

prostrate.

small shrub, up to
1 m. tall, aromatic;
flowers white.
"muña" said to be used for stomach
medicine.

fruit dry, easily dropped.

dwarf shrubs 0.4 m. tall;
flowers whitish

1947 Bolivia

all done ↓

✓ (59) Sept. 17 – Rio Unduavi, about
10 km. below Unduavi
steep wall of ravine above
river, dense Chusquea-filled
woods. 2000 m.(e)

28667 Cinchona pubescens var.
9 occasional

9 68 Cinchona pubescens var.
occasional

✓ Sept. 17 Rio Unduavi 10 km.
below Chaco

69 Cinchona calisaya
around edges of banana
and coffee plantations

✓ (55) Sept. 17 – Just west of Chulumani
steep bushy slopes, full
sun

✓ 70 Cinchona calisaya
edge of banana plantation

9 71 Cinchona calisaya
in brush

✓ 72 Condaminea corymbosa
common in brush

La Paz –

16° 17' S.
67° 58' W.

tree 10 m. tall, 15 cm. thick,
sterile; leaves subglossy above,
veins reddish below. (bark sample)

sterile sprout 2 m. tall;
leaves dull above, veins
reddish.

1700 m.(e).

16° 21' S bushy tree 5 m. tall, with
67° 51' W several trunks; old leaves
red.

16° 23' S
67° 34' W

vigorous clump of sprouts
5 m. tall; fruit immature.

small tree 3 m. tall;
leaves dull, turning red in age.

shrub 2 m. tall

1947 Bolivia

23073

3 occasional in brush

5 74 Cinchona calisaya

rare in brush

✓ (53) Sept. 17 – hills 2 km. w. of Tajma. drainage of Rio Chulumani

all day

steep ~~[illegible]~~ densely wooded slopes, not especially wet at this season

8 75 Siphocampylus

common in cleared, brushy areas.

15 76 Cinchona pubescens var.

common on steep slope

8 77 Cinchona pubescens var.

common on steep slope

2 78 Vaccinium

rare in thick woods

1 79 Coccocypselum

rare in thick woods

La Paz – Sur Yungas

small tree 4 m. tall; flowers whitish.

clump of sterile sprouts 2 m. tall; leaves dull above.

16° 15'–17' S

67° 32'–34' W.

vine-like shrub.

tree 10 m. tall, 12 cm. thick, leaves dull above, veins slightly reddish; flowers fragrant, pale pink (bark sample)

tree 8 m. tall, 9 cm. thick; leaves dull above, paler beneath; flowers fragrant, pale pink. (bark sample).

vine-like shrub, tangled in undergrowth; corolla coral pink, mouth white, whole broadly ellipsoidal, waxy-fleshy.

ascending 0.6 m. tall; fruit blue.

1947 Bolivia

28680 Centropogon
1 rare along trail in woods

6 81 Psychotria
rare in woods along trail

10 82 Cinchona
common locally in woods
on steep slopes

"quina amarilla"
bark not harvested.

7 83 Cinchona
same

10 84 Cinchona
in woods on steep slopes

6 85 Palicourea
rare in woods

10 86 Cinchona
common in woods

3 87 Galium
common locally in woods
on flat place.

7 88 Cinchona pubescens var.
local on flat place

La Paz - Sur Yungas

arching weak shrub
1.5 m. long; flowers brilliant
orange, paler distally;
column yellow, red at summit
anthers purplish-gray.

slender erect shrub 2 m.
tall; flowers whitish; fruit
red when ripe.

tree 10 m. tall, 10 cm. thick;
~~old le~~ leaves glossy,
red when old; flowers
said to be whitish and
to appear in December and
January. (bark sample).

same (bark sample)

sterile sapling 4 m. tall
(possibly showing juvenile
characters)

slender shrub 3 m. tall;
thyrse green, fruit immature

small tree 8 m. tall;
leaves dull above, buds
deep pink. (bark sample)

vine-like; fruit fleshy
red-orange.

Tree 8 m. tall; leaves sub-glossy
above, veins ~~[illegible]~~ green, turning
red in age. (bark sample).

1947 Bolivia

28689 Cinchona pubescens var
16 local on level place

✓ Sept. 17 - Tajma, Sur Yungas

coffee and coca plantation.

✓ 90 Erythroxylon coca
planted ~~in~~ in rows on
~~[illegible]~~ narrow terraces on
open slope

10 91 Cinchona calisaya
trees persisting at edge of
coffee plantation on and
at base of adobe wall

✓ (57) Sept. 17 - road bet. Chulumani
and Tajma

brushy roadside

1 92 Cinchona calisaya
steep brushy slope

✓ (58) Sept. 17 - Chulumani, Sur Yung.
weeds on bare ground in ~~citrus~~ orchard
of experiment station

✓ 93 Drymaria

1 94 Diastatea

La Paz - Sur Yungas

tree 7 m. tall, 15 cm thick;
flowers fragrant,
pale pink (bark sample)

1500 m. (e)
16°18' S.
67°32' W.

shrubs 0.5 m. tall;
fruit immature.
"coca" leaves chewed by
Indians.

tree 5 m. tall, gnarled
and spreading; leaves
glossy.
"quina calisaya"
bark harvested extensively

1500 m. (e)
Same Dat.

clump of sprouts 1.5 m.
tall, sterile.

1700 m

clumps, probably from seeds in manure.
fls. lavender.

1947 La Paz

due I

✓ (52) Sept. 27 - La Paz
cultivated in garden (brought in by local person)

28695 Cantua buxifolia

"cantuta"

96 Cantua buxifolia

I

~~Sept.~~ Sept. 29 - Altiplano south of La Paz, from El Alto to Ayoayo.

Entire altiplano is treeless, mostly intensively cultivated & grazed, badly over-grazed and eroded. ~~slop~~ much rolling land, occasional steeper ridges, the slopes very badly eroded, the steeper ones down to bed-rock. The gentler slopes are more intensively cultivated than the flat deposition areas below, probably because of ~~[illegible]~~ drainage vs. impermeability of soil below. No humus in evidence, much broken rock in soil.

corolla with basal half of tube yellow, distal half and limb crimson.

corolla with tube yellow more or less flushed with pink without, limb old-rose pink.

very thin close grass and #28702 covers ground, resists grazing to a certain extent. Baccharis and Tetraglochin are dominant on eroded slopes. Tola was formerly abundant on most of these areas, but now has been completely eliminated near La Paz by being harvested for fuel. An area at Collana still has Lepidophyllum (tola) as an almost pure stand, but relatively small plants (up to 0.4 m. on dry high ground, up to 1 m. on low sandy bottom-land), the larger ones having been harvested for fuel. Tola contains

1947 La Paz

with J. Carpo. ⑦⑥ Sept. 2~~8~~9 – Collana

78697 ~~Le~~ Parastrephia lepidophylla (Wedd.) Cabrera det. J. Cuatrecasas
6 gently sloping alluvial soil, dominant and almost only species.

v ⑥⑨ Sept. 28 Calamarca 4200 m

bare rocky eroded slope

1 98 ~~Barnadesia~~ Dasyphyllum ferox (Wedd.) Cabrera det. J. Cuatrecasas
rare

6 99
occasional

78700 Baccharis incarum Wedd. det. J. Cuatrecasas
2 dominant plant

1 01 Senecio spinosus DC. det. J. Cuatrecasas
rare (one seen)

3 02 Junellia minima (Meyen) Moldenke det Moldenke
very common, in places forming continuous ground cover.

6 03 Chersodoma iodopappa (Sch. Bip.) Cabrera det. J. Cuatrecasas
rare

1 04
occasional

branched shrub up to 0.7 m. tall, aromatic, resinous; flowers yellow "tola" harvested and baled and sent to La Paz for fuel.

much branched bush 1.5 m. tall, leaves mostly fallen; past flowering

dwarf shrub, intricately branched, 0.4 m. tall; flowers yellow with purple-black markings on banner.

densely branched dwarf shrub, resinous, flowers whitish.

flowers ~~deep yellow~~ deep purple-red with yellow anthers.

forming dense gray mat; flowers white, tinged with pale lavender

rounded densely branched bush.

dried when collected. Said to be aromatic when fresh.

1947 La Paz

28705 Tetraglochin
2 one of dominant plants
over large areas of badly
eroded land.

cultivated in plaza
" 06 Salix
~~[illegible]~~

" 07 Salix
♀

much resin and is not
eaten by anything but llamas.
Their excrement, because of
this resin, is a valuable fuel,
and, when used as fertilizer,
decomposes only very slowly.
The plants are pulled up
by the roots, baled, and
shipped by rail to La Paz.
Several cacti including
two ~~of~~ caespitose Opuntias
and a red-flowered Echinocactus
with caespitose
heads with very long
dense slender spines are

dwarf shrubs 1 - 3 dm. tall.

shrubby tree, diffuse
habit, 4 m. tall, with
young fruit, leaves
scarcely out. "sauce"
same, ♀ flowers, stigmas
yellow-green; ♂ plants
not seen. "sauce"

found on the rocky
slopes. Pycnophyllum
is locally common.

1947 ~~La~~ Paz Bolivia

Pat

✓ EL Oct. 1 - La Paz

weeds in patio between stone

23703 Senecis

09 Sisymbrium

10 Matricaria

Oct. 1 - La Paz - Guaqui by railroad.

The rainy season has started a month earlier than usual, and the grass tufts are already showing a slight touch of green.

The normal rainy season here is from about November to April. The rain supposedly comes from two sources - Pacific winds which bring violent rains of short duration, and the Yungas (really Trade) winds, which bring rains of longer duration but less violent (fide Posnansky).

During the dry season it is almost useless to try

La Paz

disk yellow.

flowers pale yellow

disk greenish yellow,

rays white, scarcely developed

plant aromatic.

to collect plants on the altiplano and near La Paz. Nothing is in condition. About March to May would be the logical time to collect here to get the most plants in condition.

1947 Bolivia

Sept. 23 - plants collected
at
on shores of Lago de Titicaca
by Guillermo Crespo + Raul Perez

A		"muña"
B	Polylepis	"queñina"
C	Baccharis	
D	Baccharis	
E	Cassia	
F	Gnaphalium	
G	Cassia	
H	Baccharis	

1947 Peru

Oct. 2 - Puno - Cuzco by rail

Around the lake at and near Puno were many gulls and some cormorants. Great expanses of mud flats have been exposed by the lowering of the level of the lake (4.3 m. since 1930 acc. [illegible] Crespo, but has risen 1.5 m. in last 2 years).

The valley above and below Juliaca is quite grassy - Stipa, etc.

Near Pucará the flat ~~fall~~ valley floor is of small hummocks of white clay. There is a [illegible] local pottery industry here, producing small figures, ash trays, mugs, bowls, pitchers, etc. of a rather unattractive dark greenish brown glaze.

The upper valley of Rio Pucará has broad flat rich grasslands. The grass is more abundant

and less overgrazed here than anywhere I have seen. Herds of llamas, cattle & sheep are abundant here.

It is said that during the last few years when the level of Lake Titicaca has lowered, the [illegible] totoras, (Scirpus aff. lacustris) have largely died off, and that the "balsas" or boats made of them have largely disappeared. The boats only last 2-3 years and must be replaced. Now the Indians are learning to use other boats and the "balsas" may not come back, even though the Scirpus is reappearing with the rise of the water.

1947 Peru

✓ ⑬ Oct. 2 Ararranca, near head of Rio Pucará
Dept. Puno, Prov. ~~a~~Ayaviri

28711 ~~earth~~ Alchemilla
earth bank of small stream
in open puna grassland

✓ (112) Oct. 3 - Cuzco, ruins of
Sachsahuaman
brushy trail-side

12 Berberis
occasional

✓ Oct. 3 Cuzco
cultivated in patio

13

14 Lavatera

✓ Oct. 4 - slopes below Machupicchu,
canyon of Rio Urubamba
steep slope, not dry but
cleared and burned over, in
some places brushy. 2040–2840 m.

15 Monnina
rare

16 Dodonaea viscosa
common locally

17 Liabum
rare in open places

Puno – Ayaviri
Cuzco – Cuzco, Urubamba

14°30' S
70°55' W
4127 m. (alt.)

prostrate, flowers
greenish-yellow.

13°31' S
71°59' W

Senecio is in much fuller
bloom than 2 months ago, every-
thing is much greener.

shrub 1 m. tall, intricately
branched; flowers yellow

shrub 2.5 m. tall, flowers white.

shrub 3 m. tall, flowers
rose-pink

2200 m shrub 1.5 m. tall, slender;
flowers indigo-purple with
greenish-yellow keel.

2250 m. slender small tree 4 m. tall

" sprawling herb up to 1 m.
long, lactiferous, flowers deep yellow.

1947 Peru

7-27 18 Lantana
3 rare
2 19 Senecio
rare
2 20 Galium
occasional
3 21 Phytolacca
rare
2 22 Baccharis
rare
1 23 Gnaphalium
not common
3 24 Baccharis
not common
1 25 Daclausia
rare
1 26 Begonia
rare
3 27
common in rock crevices
5 28
1 common in brush
4 29 Verbena
common weed
4 30 Solanum
occasional

Cuzco Urubamba

2250 m. slender shrub 1 m. tall;
flowers lavender-purple.
2400 m herb 1 m. tall; flowers yellow.

.. vine-like; fruits
orange, fleshy.
.. low, much branched herb;
flowers white, touched with reddish.
2500 m. dwarf-shrub, 3 dm. tall,
branched at base.
.. heads yellowish

2700 m. sparsely branched shrub
2 m. tall; flowers cream-white.
..

.. scape orange-bronze; flowers
vermillion.
2750 m fronds very young

.. shrub 2 m. tall; flowers
bright purple.
herb, branched at base,
flowers violet.
shrub 1 m. tall; flowers
mauve

Peru 1947

✓ morning Oct. 4 Macchupicchu
paths and terraces about ruins

2731 Fragaria
5 abundant on

3 32 Pityrogramma
common on cut earth banks

2 33 Heiracium
rock walls

4 34 Capsicum
cultivated on terrace of ruins

1 35 Galinsoga
weed on terraces of ruins

✓ 113 Oct. 6 - Aguas Calientes, Prov. Canchis 14°27' S
near head of Rio Vilcanota 71° 5' W.
meadow filled with warm
springs and streamlets flowing
from them

1 1 36 Hormidium
on bottom in spring noticeably warmer
than body temp. but not uncomfortably
warm, not sulfurous but with
some iron

Cuzco - Urubamba
Canchis

flowers white.

flowers yellow

herb 1.5 m. tall;
flowers deep purple,
fruit greenish - black,
turning red when ripe.

rays whitish, disk
dull greenish yellow.

dull dark blue-green.

Oct. 7 - Puno - Arequipa by rail. Valley of Rio de Coata is very flat, obviously recently drained lake-bed. Valley of Rio Cabanilla is pure puna; great expanses of "ichu" (Stipa) grazed but not much cultivated. Apparently burned over frequently. Mountains here are mostly not rugged. To Santa Lucia (4039 m.) the valley bottom is flat. After S. L. a stronger climb follows.

Tetraglochin subdominant

In the hills ~~around~~ between Lakes Cachipascana + Saracocha (+-4400 m.) "tola" scrub replaces the puna, locally, but much mixed with "ichu" some Baccharis. At ~~Lagunillas~~ Saracocha tola was seen baled for shipment. At ~~Paso Alto~~ Lagunillas a herd of llamas loaded with tola was seen. It is shipped to Arequipa + Puno for fuel.

above Lagunillas, around Paso Alto the grass changes. "Ichu" is largely replaced by a Festuca (?) also a bunch grass.

(Cañagua - cereal like quinua, smaller, plant very small 2-3 dm.) Puno.

Crucero Alto (14666 ft. acc. sign on station). Alkaline flats with turf + pools of water surrounded by low rounded hills. Most abundant grass a very low turfy sp. Dry at this season. Just beyond here are large herds of alpacas - smaller and more squat than llamas, shorter necks, thicker ~~hair~~ wool. Grazing in low wet meadows. Also several small herds of vicuñas were seen not far from track. Grazing in low wet meadows.

Beyond this an area of bare light soil with scarcely any vegetation - scattered bunches of grass and patches of Pycnophyllum. Grass is dull, dark, (Stipa pungens?) Pycn. golden yellow. Looks like old lake bed. One part has a small lake still. Patches of Pycn. mostly eaten out in center, prob. by alpaca.

This plain is the Pampa del Confital.

In distance is magnificent snow-covered cone of Nudo de Ampato (6300 m.) Looks volcanic, as does N. de San Jeronimo, a little this side of it.

Alpacas said to need to eat close to soil to keep teeth from growing too long.

This pampa changes around Vincocaya (4377 m.) to s.w., into low sparse tola, widely spaced,

In hills about ~~Beyond Vin~~ Vincocaya is puna largely of S. pungens, lower down with some S. ichu. Of these the former is called ichu, the latter paja.

Beyond Vincocaya Tola is the dominant vegetation for a long distance, varied here and there by patches of puna or mixed.

Nearer Arequipa are several large bare volcanoes the principal ones being Chachani, a compound cluster of peaks, Misti, a simple high cone, Pichupichu, etc. Little snow on them now.

March and April said to be best months for plants here in high areas.

Tola largely replaced by puna as volcanoes are approached

1947 Peru

mining

At Pampa de Arrieros, at west base of Volcan Chachani, baled tola seem to be a principal item of commerce.

From here on for a long distance is a waste-land of lava flows and ash beds, with a true desert shrub vegetation - small leafed intricately branched shrubs, widely spaced. Cacti (Cereus) common. no trees. No livestock seen. Watercourses in deep gorge. A few flat places with water planted to alfalfa. Here ~~are~~ Salix & Eucalyptus and a few Schinus.

(93) ✓ Oct. 7 - 5 km. s.w. Vincocaya, Pr. Cailloma
Dept. Arequipa

17737 Stipa pungens
dominant on sandy flats

✓ Oct 7 - Pucacancha,
Dept Arequipa

38 Lepidophyllum
dominant over large area

caespitose, prickly.

resinous aromatic
shrub 0.5 m. tall; heads yellow
"tola" used for fuel.

1947 Peru

Oct. 9 - Arequipa to Chala by road.

Leaving Arequipa the road climbs the rocky dry hills to the south of the valley. These have a good growth of at least 3 species of Cereus, one the massive erect columnar one seen further north, one a slender freely branching very spiny one, and one with a trunk and a dense irregular verticel of horizontal branches above. Sparse brush occurs here between the cacti. Nearer the coast the road descends and recrosses the valley below Arequipa. It is the usual green irrigated valley with dry bare walls. North of here the hills and flat places are completely without vegetation except for a few irrigated valleys.

(a Tillandsia) sand and
everywhere in these hills
Blown in from the
coast.

To Camaná there is
no strand veg.
north of Chala
there is in flats
behind beach.

Arequipa

until about 18-20 km. s.e. of Camaná, the lomas had apparently been moistened by fog, and supported a thin but colorful growth of herbaceous plants. Most of these have thick roots or tubers. Their flowers, in many cases, are quite variable in color, i.e. Nolana, Solanum, ~~[illegible]~~ Lotus(?), etc. Nolana is dominant so that it actually gives a bluish color to the landscape. The soil is a fine, light colored silt.

The Camaná valley is extensive, and has an important irrigation system.

North of here are a few patches of lomas vegetation, but poorly developed.

About 100 km. s. of Chala are rocky hills with the columnar Cereus and some other vegetation (seen at night only)

1947 Peru

mimeog

✓ (97) Oct. 9 - 13 km. s.e. Camaná

"lomas" or hills of fine light colored silty soil, with herbaceous vegetation only dominated by Nolana

23739 Phacelia
5 rare on small alluvial fan

6 40 Chenopodium
abundant locally on alluvial fan.

41 Calandrinia (or Talinum)
common locally on alluvial fan.

1 42 Chenopodium
rare on alluvial fans

1 43 Cryptantha
rare on alluvial fan

44 Verbena
rare on slopes and alluvial fan

1 45 Alstroemeria
common on steep slopes

1 46
occasional on alluvial fan.

1 47
common on ~~slopes and~~ alluvial fan

3 48 Lotus
common on slopes and alluvial fan

3 49 Lotus
common on slopes (with #'s 7-43)

plant branched at base
flowers deep purple.

annual (possibly young plants of # but probably not)
very glaucous, fleshy,
spike nodding, corolla deep crimson-magenta.

probably young plant of #.
flowers white

flowers white, ~~tur~~
purplish tinged, strongly fragrant with honey-like odo.

not in flower now.

flowers bright rose.

flowers bright rose

flowers purple.

flowers white.

1947 Peru

28750
1 occasional on slopes
51 Zygadenus
abundant locally on slopes

52 Nolana
1 rare among plants of #
3 53
occasional at foot of slopes

7 54 Solanum
abundant to common on
slopes
1 55 Solanum
rare, with # 28754
4 56 Drymaria
common on slopes
5 57 Chenopodium
occasional on slopes and roadside
2 58
rare on slopes
6 59 Nolana
dominant plant, abundant everywhere

3 60 Oxalis
occasional on slopes,
especially near rocks
5 61 Cardamine (?)
local on steep slopes, especially
near rocks

flowers white, purplish
outside, especially on midribs
— of segments.
white flowered extreme
— of # 28759
rays deep yellow,
inner bracts reddish,
— bases of outer bracts reddish
flowers varying from
white to deep purple, deeper at center,
— anthers yellow.
entire leafed extreme of,
— # 28754.
flowers white, petals
— entire.
perennial, plant
depressed.

prostrate flowers
violet, varying to
— deep purple and to white.
tuber orange within;
flowers bright yellow,
— flushed with vermillion outside.
erect; flowers white.

1947 Peru

18762 Cryptantha
2 steep slopes near rocks, very local

3 63 Tetragonia
common on steep slopes

2 64 Plantago
common on slopes

3 65
common on steep slopes

1 66
occasional on slopes and ravine sides.

5 67 Nicotiana
common along roadside and banks of ravine

1 68 Hypericum
rare on banks of ravine

6 69
common on banks of ravine

1 70 Erodium
rare on banks of ravine

flowers white.

leaves fleshy, covered with crystal-like glistening distended cells; flowers yellow.

flowers bright rose.

erect herb 1-1.5 m. tall; flowers yellow

flowers orange-yellow.

flowers bright rose

flowers rose.

1947 Peru

✓ (85) Oct. 10 – First headland north of Chala, km. 640

rocky slope, dominated by dwarf-shrubby Heliotropium and ~~Sphaeralcea~~ Nolana

23 7 71 Argemone mexicana
4 common along roadside

5 72 Heliotropium
dominant on rocky slope

3 73 Heliotropium
same

4 74 Heliotropium
same

6 75 ~~Sphaeralcea~~ Nolana
dominant, in places coloring slopes purple.

5 76 Croton
occasional Tanaca.

✓ (86) Oct. 10 Los Arenales, km. 600
40 km. n. w. of Chala
bare sand flats and small dunes just back of beach

6 77 Sesuvium
large masses holding small hummock-like sand dunes

3 78 Macrocystis
thrown up on beach in large quantities

to 0.8 m.
ellow.
f shrub,
with
dor,
w early.
d with

te,
ssnich.
wers

h.

flat
lain

of sand

stems 1 cm. thick; leaves very fleshy but compressed, gray; flowers pink.
(much larger in every way than S. port.)
long, ~~[illegible]~~ several m., vine-like.

28797 - ~~[illegible]~~ 837
28838 - 47
28848 - ~~6?~~ 63

were located
make molds

please see whether
28708 - 10 (Bolivia)
and 28711 - 96 (Peru)
are ~~[illegible]~~

still missing

Also see if 28000 - 165
and 28250 - 70 are
missing too [illegible]

1947 Peru

✓ (84) Oct. 10 – First headland
north of Chala, km. 440

rocky slope, dominated
by dwarf-shrubby Heliotropium
and ~~Sphaeralcea~~ Nolana

2377 71 Argemone mexicana
4 common along roadside
5 72 Heliotropium
dominant on rocky slope

3 73 Heliotropium
same
4 74 Heliotropium
same
6 75 ~~Sphaeralcea~~ Nolana
dominant, in places
coloring slopes purple.
5 76 Croton
occasional Tanaca.
✓ (85) Oct. 10 Los Arenales, km. 600
40 km. n.w. of Chala
bare sand flats and small
dunes just back of beach
6 77 Sesuvium
large masses holding
small hummock-like sand-dunes

3 78 Macrocystis
thrown up on beach in large quantities

glaucous herb up to 0.8 m.
tall; flowers pale yellow.
low, branched dwarf shrub,
flowers fragrant with
strong honey-like odor,
white with yellow center.
same, flowers tinged with
purplish.
same, flowers white,
center slightly greenish.
spreading; flowers
rose-purple.

low much branched bush.

back of this, across a flat
is an actual mountain
of sand

stems 1 cm. thick; leaves
very fleshy but compressed,
gray; flowers pink.
(much larger in every way than S. port.)
long, ~~[illegible]~~ several m., vine-like.

1947 Peru

missing

✓ (55) Oct. 10 – 4 km. n.e. of Valle de Vaca, n.e. of Nasca
desert with no vegetation but lichens, except along roadsides, where a number of plants are common

28779 Chenopodium
2 common along roadside

3 80 Suaeda
rare along roadside

4 81 Amaranthus
abundant along roadside

Oct. 10 – Nasca

irrigated valley, roadsides and stony wash

5 82 Bulnesia retamo (Gill.) Griseb.
common on stony ground in washes and alluvial fans (for many miles on alluvial fans practically the only plant)

5 83 Buddleia
common along fence-row

5 84 Pluchea
common along fence-row

5 85 Trixis
common along fence-row and on rocky ground

reddish – glaucous, densely branched.

glaucous, fleshy, densely branched, erect.

reddish, bushy, erect.

dull green erect shrub 1.5 m. tall, [illegible] almost leafless; flowers yellow. "calato"

shrub 3 m. tall; flowers lemon yellow.

shrub 2.5 m tall, heads purplish.

shrub 1 m. tall; flowers yellow.

1947 Peru

Oct. 10 - Chala to Ica by road.

Just north of Chala, across the bay, there is a headland of rocky hills that are green - high up are patches of what are probably Schinus molle, it also runs down certain ravines. A ~~Malvastrum~~ Nolana with purple-magenta flowers ~~& Phacelia-like~~ ~~mallow~~ colors many of the hills purple. Locally there is something that looks a bit like Eschscholtzia, but I did not get a close look at it.

About 40 km. n.w. of Chala at Tanaca there are small dunes covered and held by a gigantic Sesuvium. Behind this, some way in from the coast, is a mountain of sand. Several more like this seen further north, but further in from coast.

About 50 km. s.e. of Valle de Vaca, (90 km s.e. of Nasca) is an area with a very noticeable perennial vegetation of ~~H~~ a prostrate Heliotropium, an erect Nolana (?) and quite a number of other things. Did not stop. This extends much further north right along the road but not naturally. I don't know why - there is vegetation along roadsides and not away from them.

The Valle de Vaca region, outlier of Nasca valley, is interesting in that it is the southern limit of a number of plants, at least as far as the road is concerned - such as Prosopis, Vallesia, Parkinsonia aculeata, Trixis, Pluchea, # Bulnesia 28782 etc. ~~etc~~ The latter is practically the only shrub or plant on tremendous areas of alluvial fan, such as Pampa de Cinco Cruces, n. of Nasca. Present more or less

1947 Peru

intermittently as far as Ica Valley.

Cercidium occasional in some of valleys between Nasca & Ica, with Parkinsonia aculeata.

Prosopis very common here.

Cotton is raised as far south as Nasca, some sporadic unsuccessful attempts further south. A curious shrubby perennial specie is raised, which blooms and produces cotton at same time.

In valleys between Nasca and Ica Oranges are principle tree crop, as well as cotton. In Ica Valley cotton and grapes are most abundant. At this season the grapes seem to have just leafed out. They are trellised up somewhat.

Salix here, both diffuse and weeping types, are now in full flower.

~~Th~~ The squares in Ica are dominated by huge Ficus nitida(?) trees.

In all these valleys, from Camaná to Ica, Ficus carica, here called higos, is very common.

In the ~~next~~ valley de Yauca ~~south of Valle de Vaca~~ is a tremendous grove of olives. It fills the whole irrigated part of the valley.

Back of Ica the ravines on the steep slopes are conspicuously filled with sand.

In Ica are occasional Eucalyptus, Phoenix, ~~and~~ Washingtonia, Grevillea, Cedrela, Delonix.

1946 Peru

Oct. 11 - Ica - Lima by road. From Ica west are vast sand plains and sand hills. About 30 km. w. is a large area where Phoenix dactylifera is abundant. Again, about 30-50 km. further is another such area, quite extensive. Here Ficus carica is also common. Both appear wild. These areas are quite saline. Distichlis and another grass, a slender reed, are dominant. In the second area, at about km. 271, salt water apparently comes to the surface by capillarity, evaporates, leaving an extensive deposit of salt in the surface layers of the sand, in some places being almost pure, in others much mixed with soil. This should be analyzed for potassium. If by chance there is any K. it would be exploitable.

inland from Pisco

Back of Pisco are salt marshes and standing salt water. Distichlis is principal

vegetation, but Salicornia is common.

Phoenix dactylifera is occasional throughout this salty area. The fruits are said to be not very good.

1947 Peru

✓ missing Oct. 11 - Km. 190 n. w. of Chincha

(93) dessicated roadside depression with tiny patch of vegetation in otherwise absolutely bare ground, with Chenopodium murale Trifolium sp. (sterile) Sesuvium portulacastrum and Heliotropium curassavicum

✓ 8786 Heliotropium curassavicum

✓ 87 Sesuvium portulacastrum

✓ Oct. 11 - Asia,

dry, brushy roadside

✓ 88 Solanum

✓ 89 Verbesina

occasional in brush

✓ 90 Lippia

common along roadside

✓ 91

occasional in brush

---

prostrate, glaucous; leaves fleshy; flowers white with greenish center.

prostrate, stems reddish; leaves flat, fleshy; flowers pink.

semi-prostrate; flowers yellow.

shrub 1 m. tall; rays yellow, disk greenish-brown.

prostrate; flowers pink.

shrub 1.5 m. tall. much branched, mostly bare of leaves.

Peru 1947

✓ Oct. 12 – Lima
botanical garden

28792 Cardamine bonariensis
2 in muddy ditch

4 93 Sambucus
planted

2 94 Viburnum
planted

2 95 Heliocarpus
planted

3 96 Cantua pyrifolia
planted

Lima

flowers white, valves of pods elastically coiling on dehiscence.

— ~~tree~~ bushy tree 4 m. tall; flowers white, fruit black.

— tree 5 m. tall; flowers white.

— tree 8 m. tall

— shrub 2 m. tall; flowers whitish.

1947 Peru

Oct. 20 – Tingo Maria.
Rio Huallaga

Flat valley floor with tall forest, now largely cleared, but evidently formerly with a canopy 30-40m from ground. Now largely open, even where remain patches of forest, so there is a dense undergrowth of Heliconia, Acanthaceae, etc.

The sides of the valley are bluffs and domes of limestone, magnificently wooded. However, even with all this limestone the soils are said to be acid.

1947 Peru
Oct. 21

Going from Tingo Maria to Cordillera azul as soon as the road begins to rise over low foothills along sides of valley, Ladenbergia magnifolia and Cinchona micrantha begin to appear, but only as seedlings and sprouts, as the parts near the road have been cleared.

At km. 160 there are quebrada walls with second growth woods with Ladenbergia magnifolia and another Ladenbergia with brown hair. All trees seen were young and sterile.

The road gradually climbs and the Ladenbergia magnifolia persists, but C. micrantha drops out. A C. pubescens var. similar to the q. amarillo of Tabaconas appears rarely, seedlings only. Camibuena also. No large trees seen. Tea plantations frequent here. Very wet. The woods, where remaining are thick.

At Divisoria, the gap in the mountains is a belt of Cinchona — C. pubescens (ovata) and C. ? (like lucumaefolia) [illegible] V

1947 Peru

✓ (93) Oct. 21 - Km. 160, road from Tingo Maria to Pucallpa,

drainage of Rio Huallaga

second growth forest on steep side of ravine.

28797 Cinchona (Ladenbergia)
2 common locally

✓ (77) Oct. 21 Km. 189, road from Tingo Maria to Pucallpa, just w. of La Divisoria, Cordillera Azul
weedy roadside thickets

5 98 Acalypha
common

4 99 Amaranthus spinosus L.
common weed

28800 Deeringia
4 common

8 01 Physalis peruviana
occasional

---

950 m. (e)

9°4' S
75°53' W

slender sapling 5 m. tall, sterile.

1500 m. (e)

shrub 2 m. tall

herbs up to 1 m. tall.
spines very poorly developed.
sprawling vine-like herb, to several m. long, buds green, fruiting panicles red, seed embedded in white pulp.
branched herb, up to 1 m. tall flowers pale dull yellow with 5 purple-black spots in center. fruit edible but scarcely ~~[illegible]~~ maturing here. "capuli"

1947 Peru

28802 Phenax
12. 03 occasional
04.
4 05 Liabum
common

2 06 Erigeron canadensis
common

✓ . Oct. 21 - La Divisoria,
Cordillera Azul

second growth woods,
quite wet.
2 07 Vaccinium
occasional on ~~b~~ cut banks

3 08 Cinchona
common
5 09 Cinchona
common

10. Sabicea
occasional
1 ↑ 10a Cinchona pubescens
occasional

---

subshrub

herb 1-1.5 m. tall, arching,
lactiferous; flowers
pale yellow.

herb 1 m. tall; heads
white. "huamantaso"
said to be boiled and used for
diarrhoea.

(1600 m. (±))

sprawling shrub,
flowers coral red, paler
distally.

sprouts 2 m. tall,
sterile, leaves green.

tree 5 m. tall, several
trunks 8 cm. thick;
leaves green, subglossy,
petiole + midrib only
slightly red. (bark
sample).

twining vine; flowers
white.

seedling 1 m. tall, sterile,
leaves dull green above, red-purple beneath,

~~[illegible]~~ 1947 Peru

[illegible]

IV (80) Oct. 21 – Fundo Sinchono, Cordillera Azul, Rio Chino, drainage of Rio Ucayali

wet forest, largely cleared.

28811 Cinchona (Ladenbergia) magnifolia
17 ~~[illegible]~~ occasional in steep wall of river gorge

1 12
occasional, roadside thicket

2 13 Cinchona
~~[illegible]~~ planted in plantation

14
weed in small ravine in plantation

4 15 Polymnia
weed in roadside thicket

2 16 Drymaria cordata
roadside weed

3 17 Centropogon
common in roadside thickets

1500 m. (e)

tree 25 m. tall, 4 dm. thick; fruit immature.

shrub 2 m. tall

young sterile plant 1.5 m. tall. (note venation)

shrub 2 m. tall; flowers white.

sprawling herb, heads ~~of~~ orange-yellow, achenes large, green.

ascending, diffuse

elongate sprawling shrub, leaves diminishing distally, terminal part of branch bearing raceme variously bare or leafy, flowers scarlet, orange distally, column pale yellow, anthers light gray.

1947 Peru

28817 Lycopodium
2 cut bank above road

19 Cinchona glandulifera
10 20 in seed beds in full
21 sun
22

✓ (77) Oct. 22 Divisoria, Cordillera
Azul

main divide of Cordillera,
wet forest, mostly cleared.

2 23 Cinchona pubescens Vahl
in clearing

1 24 Cinchona pubescens
in bushy cleared
land, very common

7 25 Cinchona pubescens
in thick tangled very
wet woods, beside
standing water

erect

stipules deeply carinate

sterile seedlings 0.7 m.
Tall, erect., seeds brought
by H. Augusto from upper
Rio Monson.

(600 m.(?)

old half dead stub
with a few living
branches + sprouts; leaves purple
beneath; flowers (out of
season) very fragrant,
deep pink without,
pale pinkish within.
mass. coll. of an upper
side-branch tip each
from various plants,
to show variation, possibly
due to hybridization
with #28809.
tree 8 m. tall, 20 cm.
Thick; leaves green
beneath, fruit abundant
(bark sample)

1947 Peru

28826 Cinchona pubescens
~~8~~ in clearing

3 27 Palicourea
in undergrowth in thin woods
3 28 Solanum
in undergrowth in thin woods

7 29 Cinchona pubescens
in plantation clearing,
left from forest.

2 30 Cinchona pubescens
wild plant planted in
plantation
6 31 Cinchona calisaya
planted in plantation

5 32 Cinchona pubescens
planted in plantation from
wild

~~37~~ C
1 33 Cinchona
{ wild plant persisting in
plantation

---

small tree, 4 m. tall;
leaves green beneath;
heavily fruiting;
apparently infected
with Elsinoe cinchonae.
slender shrub 2 m. tall; thyrse green;
flowers white.
weak shrub, ~~[illegible]~~ 1 m. tall,
somewhat sprawling;
flowers white
tree 5 m. tall; leaves
purplish beneath,
especially on veins,
not fruiting abundantly.
sapling 3 m. tall,
leaves purplish beneath,
especially on veins.
small tree, 2.5 m. tall,
flowers pink, fragrant;
seedling from ex-Japanese
planting at Punizas (Adger).
sapling 3 m. tall;
leaves somewhat purplish
beneath, red veins.
(showing some suggestion
of hybridization with
#28809 - thick small leaves).
leaves glossy above,
green beneath. only oldest
leaves with red ~~[illegible]~~ midrib + petiole

1947 Peru

dow I

✓ (73) Oct. 22 - Pumahuasi,
Rio Tulumayo, affluent
of Rio Huallaga

steep rocky cut near river:
28734 Cosmibuena
3 occasional, but only
young plants seen
(true both here and at
Divisoria)

✓ Oct. 22 same, further
down
flat valley bottom
5 35 Hamelia patens
common along roadside
ditches.
36 Erythroxylon coca
3 cultivated on valley floor,
(also on slopes)
plants planted in
holes about 2-3 dm.
square and deep. these
gradually transformed
by cultivation into
ditches as the holes are
~~brought~~ connected.

sterile shrub 1 m. tall. leaves
green, very thick.

shrub 1 m. tall;
flowers deep orange-red.

slender shrubs ~~[illegible]~~.
1-1.5 m. tall, ~~[illegible]~~ leaves
pale green; flowers
white; fruits red
when ripe. Leaves
have been stripped
frequently.
Her

1947 Peru

✓ Oct. 23 - same Km. 164
steep wooded slope

28837 Cinchona (Ladenbergia)
24 occasional
~~taken~~ in hollow twigs inhabited by ants.

8 38 Vismia
common

✓ Oct. 23 Hacienda La Vega,
drainage of Rio Tulumayu,

moist forest, partly
cleared, clearings planted
to tea and pineapples, but
badly overgrown with
Pteridium aquilinum

9 39 Cinchona micrantha
~~small tree~~ left in
clearing

3 40 Pteridium aquilinum (L.) Kuhn
extremely abundant,
dominant weed over
tops and sides of cleared
hills often burned.

12 41 Psychotria capitata R.&S. det. Kirkbride,
left in clearing. ~~sd~~

950 m.(e) tree 10 m. tall, 12 cm. thick,
leaves dull, not turning
red. (bark sample)
shrub 2 m. tall (other
seen 5 m.); calyx brown,
corolla pale green.

1000 m.(e)

small tree, 4 m. tall,
leaves dull above, veins
turning red; flowers
white, fragrant.
~~sd~~ rhizomes prostrate,
subterranean; fronds
1—2 m. tall, densely
tangled.

1977 small tree 6 m. tall,
10 cm. thick; leaves dull,
green beneath, turning red
(bark sample) when old; flowers fragrant, white, tube whitish without below,

1947 Peru

28842 Eleagia
7 commonest tree in forest

3 43
common in forest

4 44 Psychotria macrophylla R.&P. det. Kirkbri, 1977
common in forest

13 45 Cinchona (Ladenbergia)
common in forest

2 46 Aphelandra det. D. Wasshausen
rare in underbrush at edge of forest

1 47
rare, climbing in trees in forest.

This region, an old flood plain in the valleys of Rio Tulumayo and Rio Azul, stretching between the two, is dissected toward the two rivers by series of quebradas. It is said to be, and apparently is, much ~~dry~~ drier than either the Valley of the Huallaga or the Cordillera Azul.

slender tree 7 m. tall, others many times as large.

small clumps.

sterile sprouts ~~1.5~~ 2 m. tall.

tree 15 m. tall, 18 cm. thick; leaves dull to sub-glossy. (bark sample)

shrub 1.5 m. tall, corolla curved, yellow.

vine, twining; flowers whitish; fruit green.

the forests on the quebrada slopes are largely Eleagia and Ladenbergia, but have a liberal sprinkling of Hevea (with yellow latex) and some other trees, including a small palm. The flat is cleared. Cinchona micrantha is found on the flat and down over its edges in the heads of the quebradas, but not much further down.

do V

1947 Peru

✓ (50) Oct. 24 – Carpish Pass, ~~to~~ just w. of gap.

Low mossy cloud forest ~~and~~ with brush on ridges.

28848 Centropogon
5 occasional in brush

6 49 Nertera tetrasperma HBK.
abundant locally

2 50 Thuidium
abundant

4 51 Chusquea
common

5 52 Gaultheria
occasional in brush

~~4~~ 1 53 Symbolanthus
occasional in brush

2 54 Macrocarpaea
occasional in brush

Huanuco

sparsely branched shrub, 1 m. tall; flowers red with yellow lobes and column, blackish anthers.

prostrate, forming mat; ~~flo~~ fruit dark red, 4 seeds.

tangled climbing canes, inflorescences dark red-purple. communally flowering over a small area.

shrub 1 m. tall; flowers coral pink.

shrub 2 m. tall; flowers somewhat flattened laterally, rose-crimson with white and purple lines in throat, tube vermillion without.

erect shrub 2.5 m. tall.

1947 Peru

1 28855 Palicourea
rare in brush

3 56 Myrsine
common in brush

1 57 Nertera granadensis
rare on ground in forest

5 58 Cinchona (obovata ?)
common in brush and woods.

8 59 Cinchona
same

10 60 Cinchona
same

2 61 Cinchona
same

8 62 Cinchona
same

↑

Huanuco

stiffly erect shrub 1 m. tall; ~~fl~~ inflorescence green; fruit immature.

slender sparsely branched shrub 2 m. tall; fruit immature.

prostrate, sterile.

shrub 3 m. tall; fruit deep red, ribbed when fresh.

shrub 2.5 m. tall; fruit deep red, ribbed when fresh

slender tree 5 m. tall, buds rose-vermillion, fruits deep red, ribbed when fresh. (bark sample)

shrub 1 m. tall; ~~fruits~~ leaves purplish beneath, fruits deep red, ribbed when fresh.

tree 8 m. tall, flowers (one old one only seen) rose vermillion without, lobes pink within, apparently odorless; fruits deep red, ribbed when fresh. (bark sample)

1947 Peru

✓ (8-) Oct. 24 - Upper Rio Chinchao
above Hacienda Pati, below
Carpish Pass

steep canyon wall with
dense wet forest.

28863 Cinchona (nitida?)
24 common locally

64 Drymaria
common locally along road

65 Centropogon
common locally

✓ Oct. 24 Side of valley of
Rio Chinchao, above
Chinchao

thick second growth woods
on ~~[illegible]~~ precipitous slope

66 Cinchona (purpurea?)
common (with #28863)

Huanuco

9°40'S 76°6'W

tree 10 m. tall, 12 cm. thick,
leaves glossy, bright
rather light green, turning
scarlet when old.
(bark sample)

prostrate to ascending,
flowers white.

sprawling, vine-like
shrub, inflorescence
pendent, flowers yellow
with yellow column, straw
colored anthers, bronze
green hypanthium & calyx.

coordinates?

tree 6 m. tall, 10 cm. thick,
leaves dull above, purple
beneath.
(bark sample)

1947 Peru

28867 Cinchona (ovata?)
common, (with # 28866)

(11) Oct. 24 Divisoria, Cordillera
Azul

68

in woods
↑ (brought in by Rivero)

Huanuco

tree 8 m. tall, 10 cm. thick,
leaves dull green above
and below,
turning red in age.
(bark sample)

stump sprouts (tree
reaching great size);
flowers yellowish white;
fruit discoid, red when
ripe, with powerful
turpentine odor when broken.

Rafael Peña

lawyer of Santa Cruz, Bolivia who published Flora Cruceña (1901 fecie) and poss. an earlier edition. Locally said to have based it on an early ms. left by a Frenchman who died here. Supported by a curious fact that Peña was addicted to the use of a drink consisting of alcohol in which had been soaked a plant hierba de cera(?) which does not appear in the book.

Borela - botanical student of Santa Cruz who apparently never wrote anything but who studied the flora some and one of whose sons now teaching botany at S.C.

! Peña R.(afael)

Flora Cruceña

1-287, Sucre, Bolivia 1901

an extremely badly prepared flora of the Santa Cruz area, Bolivia. It is reputed to have been a ms. left by a Frenchman who died here long ago. Apparently a shorter edition was published previously, and recently a new, much worse one has been issued. (over)

The plants are arranged alphabetically either by local or supposedly botanical names. There is scarcely a name more recent than the time of Linnaeus. Principal value is local names and uses.

Of cascarilla, said to be, in Santa Cruz "diversas especias, como _Quina lancifolia_ _Quina Hexandra_".

"Iboti" said to be guaraní name.

! ~~Peña Rtafch~~

ALICE IN BLUNDERLAND

Alice in Wonderland never saw anything more fantastic and grotesque, yet legal, than the action of the city-county liquor commission last week.

The liquor commission suspended the license of a local retailer for four violations of selling liquor below the "locally prevailing retail price."

The fantastic and grotesque aspect of this is not only in the penalizing of a man for selling at low prices. It is that the penalizing is according to law—*in fact the city-county license commissioners had no alternative if they followed strictly the provisions of the law.*

For this ridiculous situation we have to thank the action of a past legislature which wrote into the Revised Laws of Hawaii this section:

> "It shall be unlawful for any person holding a retail dealer's license to sell any liquor under such license at any price less than the locally prevailing price."

And the law so stands today though an abortive effort was made to amend it at the 1947 session of the legislature.

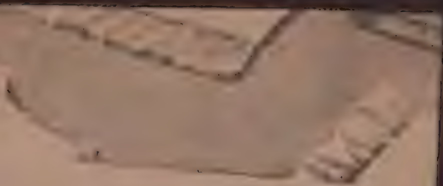
And so a dealer who was endeavoring to pass along to his customers savings which he was able to make in liquor on hand, has been penalized by the suspension of his license for one week.

Alice in Blunderland is right!

* * *

Why didn't the 1947 legislature go through with the amendment which would have eliminated this ridiculous stipulation?

Who put on the pressure or threw the sand in the machinery of legislation?



ouse

nkets

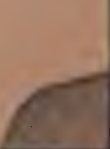
lanket for truly luxurious
d while one lightweight
virgin wool;
72" ×90". .... 41^{75}

onth

n

lankets

0% wool blankets cover
ess. Secret of its warmth



Insect Problem Studied Here by Entomologists

Insect pests of the western Pacific face a bleak future with some of the leading entomologists of the nation now in Honolulu to conduct a historic meeting to evolve methods of combatting the tiny visitors.

The three day conference, first of its kind ever held, begins Tuesday and has been arranged by the Pacific science board of the national research council in conjunction with the navy department, Hawaiian Sugar Planters association and other scientific groups.

# # #

Arriving from the mainland this morning were Harold J. Coolidge, executive secretary of the science board; Dr. C. P. Causen, principal entomologist of the U. S. bureau of entomology and plant quarantine in Washington; D. C. and Theodore R. Gardner of the nation entomology bureau.

# # #

Edward H. Bryan Jr. is the Honolulu representative of the science board who will participate as well as representatives from HSPA.

From the meeting a detailed set of quarantine regulations covering insect pests of Micronesia is expected to evolve.

High Tides Force Closing of Moana Hotel Dining Room

Because of the damaging effect of recent high tides and waves the dining room of the Moana hotel will be closed Wednesday, October 1.

MIGHTY MITE

PALO ALTO, Calif., Sept. 29 (U.P.) —A bazooka-sized atom-smasher that will generate the first artificial cosmic rays and the highest charge of electricity ever produced by man has been revealed here.

The three foot long electron linear accelerator, a tiny cousin to the cyclotrun, already has produced energies of more than 1,500,000 electron volts.

missing

78708 still

missing

?

to 796 ~~347~~

~~78349~~

~~[illegible]~~

HOTEL PUNO

APARTADO No. 129
TELEFONO 43

Habitación — Rom 15

Nº 001913

Sr.
Mr.

Agradeceremos pagar la cuenta el dia de su presentación
Bilis payable upon presentation.

Mes Oct. de Año 1947

Day Día	6	7					
Habitación Appartment	12 =						
Con pensión With pension							
Comedor Dining-Room	6 =	4 =					
Té, Café Tea Coffee							
Bar Cantina Bar Room							
Lavandería Laundry							
Teléfono Telephone							
Garage							
Total del día Day total	18 =	4 =					
Saldo anterior Forwad		18 =					
Subtotal		22 =					
Pagos Payment							

Importe Factura	22	–
Servicio 10 %	2	20
Ley No. 10626	1	10
Ley No. 10167		20
Gastos Oficina..	–	–
TOTAL S/o.	25	50

FACTURACION

¡¡NO OLVIDE ENTREGAR LA LLAVE!!

km. 400
Los Arenales
40 km. n.w. of
Chala

headland km. 640
Across bay
from Chala

---

km. 533
40 km. s.e.
Valle de Vaca
s.e. Nasca

Nasca.

Vallesia not
seen s. of
Valle de Vaca
Parkinsonia ac.
also.

+ Zygophyl. Prosopis + Tessaria

Colegio Maria Auxiliadora
Plaza Bolognesa
Padre Lonkhoff
Padre Incrata

avena machacada	Kls	-	-	-
ciruelas	〃	-	-	-

TOTALES

SALDOS ANTERIORES

RECIBO DE ALMACEN

TOTAL

ENTREGAS EN EL DIA

SALDOS

ENCARGA

Montepuncu

Huairamayu

Sihuenca

Chacctaume

x Anchu Quebrada

OCTUBRE

31 días **MIERCOLES** 1947

OCTUBRE

D	L	M	M	J	V	S
—	—	—	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	—

1

NOVIEMBRE

D	L	M	M	J	V	S
30	—	—	—	—	—	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

10o. mes — S. Remigio — 274—91

Eilif V. Miller
The Middle Huallaga River

1-66 (typewritten, in OFAR files)

Jan. 1947

Excellent geographic study, emphasis on agric.

MacCurdy, E. (ed.)
The Notebooks of
Leonardo da Vinci
1-1247. Garden City, N.Y.
1941-42

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da Vinci, Leonardo
The Notebooks of
Leonardo da Vinci
edited by Edward MacCurdy
1-1247 Garden City, N.Y.
1941-42

Translated into
English and arranged
by subject.

GRAN HOTEL "COCHABAMBA"

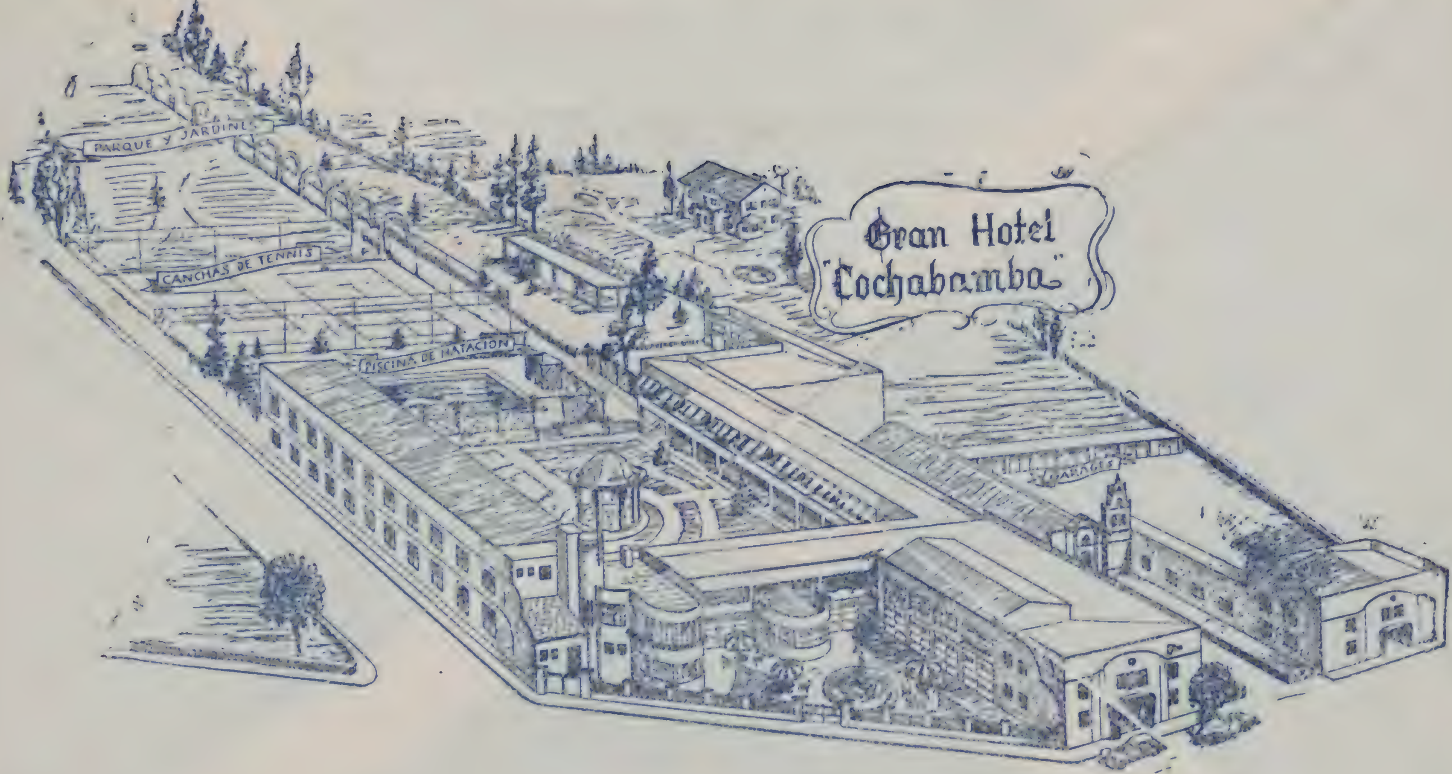
COCHABAMBA-BOLIVIA

DIRECCION TELEGRAFICA "GRANHOTEL"

CASILLA DE CORREO No. 500

TELEFONO 1224-1225

ARAUCO PRADO Y Co.
COCHABAMBA-BOLIVIA


Gran Hotel
"Cochabamba"
PARQUE Y JARDINES
CANCHAS DE TENNIS
PISCINA DE NATACION
GARAGES

Seeds

"ROYAL" HOTEL
CHICLAYO - PERU
TELEFONO Nº 181
PARQUE PRINCIPAL
DIRECCION TELEGRAFICA "ROYAL"
CASILLA Nº 16
80 HABITACIONES CON TODO CONFORT Y 40 DEPARTAMENTOS CON BAÑO PROPIO
PROPIETARIOS:
SILVA HERMANOS S. A.

Cinchona delessertiana?
from Tabaconas,
Dept. Cajamarca, Peru

Part for Exp. Sta.
Part for Naranjo.

F.R. Fosberg #27800